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Table of Contents

| ORIGINAL ARTICLES— | PAGE. | ABSTRACTS FROM CURRENT MEDICAL LITERATURE— | PAGE. |
|---|-------|--|-------|
| "The Mechanics of Respiration in Health and in Disease," by C. G. McDONALD, M.B. | 359 | Dermatology | 382 |
| "An Investigation of the Reactions of Animal Tissues Exposed to Monochromatic X-Rays of Different Wave Lengths," by W. MOPPETT, M.B., Ch.M. | 364 | Radiology | 382 |
| THE AUSTRALASIAN MEDICAL PUBLISHING COMPANY, LIMITED— | | MEDICAL SOCIETIES— | |
| The History of Its Development | 370 | Sydney Hospital Clinical Society | 384 |
| REPORTS OF CASES— | | OBITUARY— | |
| "Melæna Neonatorum," by B. B. ARMSTRONG, M.B., B.S. | 377 | Allan Peter McLeod | 385 |
| "Patches of Ossification in the Tonsils," by F. CH. DE CRESPIGNY, M.B., Ch.M. | 377 | POST-GRADUATE WORK— | |
| REVIEWS— | | Post-Graduate Course in Obstetrics | 386 |
| Optical Refraction and Accommodation | 378 | CORRESPONDENCE— | |
| A Popular Textbook on Health | 378 | Glycosuria and Diabetes | 386 |
| Rats | 378 | Research in Australia | 386 |
| LEADING ARTICLES— | | Fracture of the Skull | 387 |
| The Printing House | 379 | X-Ray Therapy | 387 |
| CURRENT COMMENT— | | Overdoses | 387 |
| Dehydration in Nutritional Disorders of Infancy | 380 | NAVAL AND MILITARY— | |
| Precipitin Reaction in Epidemic Poliomyelitis | 381 | Appointments | 388 |
| | | BOOKS RECEIVED | 388 |
| | | MEDICAL APPOINTMENTS | 388 |
| | | MEDICAL APPOINTMENTS VACANT, ETC. | 388 |
| | | MEDICAL APPOINTMENTS: IMPORTANT NOTICE | 388 |
| | | DIARY FOR THE MONTH | 388 |
| | | EDITORIAL NOTICES | 388 |

THE MECHANICS OF RESPIRATION IN HEALTH AND IN DISEASE.

By C. G. McDONALD, M.B. (Sydney),
*Tutor in Medicine, The University of Sydney; Honorary
 Assistant Physician, Royal Prince Alfred
 Hospital, Sydney.*

ADEQUATE appreciation of the mechanical forces which operate in the chest during respiration, does not come quickly. French may or may not be learnt without tears, but the study of this subject is usually associated with much frowning and tearing of hair. It does not grip us like a fireside tale.

This paper on the bio-physics of respiration in health and disease is an attempt to compress the subject into a small compass. While it necessarily manifests a considerable plagiarism of ideas, there is I trust, little plagiarism of form and some appreciable sprinkling of original points of view. I have consulted very freely many text-books of physiology and on the clinical side I have made use of much of the material contained in Powell and Hartley's "Diseases of the Lungs" and in two splendid articles by Sir James Barr, published in *The British Medical Journal* of November 9, 1907, and April 19, 1919, respectively.

PART I.

THE MECHANICS OF RESPIRATION IN HEALTH.

If the thorax of a still-born, full-time fœtus be opened the contents will be found compressed into a comparatively small space. The chest has the smallest possible diameters in all directions, the relaxed diaphragm is pushed well upwards by the abdominal viscera and the lungs are airless and compressed (atelectasis). The muscles of the diaphragm and thoracic wall are completely relaxed. The thorax is shrunken and the diaphragm highly domed by virtue of the length of these relaxed fibres.

Such is the anatomical picture not only in the still-born fœtus but in the living fœtus *in utero* as well. As the child is being driven down the parturient canal during labour, the compression of the cord and frequently the early separation of the fetal villi from the maternal sinuses in which they bathe, cause an interruption of the placental mechanism by which oxygen and carbon dioxide pass to and from the fetal circulation respectively. The child becomes cyanosed. The deficient supply¹ of oxygen (anoxæmia) and the dissociation of the hydrogen ion of the excessive H₂CO₃ in the fetal blood make

¹It has been urged on purely philosophical grounds that a deficiency of oxygen cannot stimulate the respiratory centre. But deficiency of food causes hunger and even death and who will deny that deficiency of wine makes a very bad dinner and very dull post-prandial speeches?

an urgent call upon the lethargic respiratory centre of the child. This chemical stimulation of the centre is reinforced by a reflex stimulation due to excitation of the cutaneous nerves when the child's body is born and exposed to the cold atmosphere. He takes a breath.

Anatomical Changes Following the First Respiratory Effort.

Inspiration is a muscular act. The inspiratory muscles, urged to activity, enlarge the thorax in all its diameters. The chest wall expands and the diaphragm descends. The parietal pleura lines and is firmly attached to the chest wall. The visceral pleura covers the lung. Everywhere the two layers of pleura are in complete contact, separated only by a thin layer of serous fluid. As the chest wall enlarges by muscular action, the traction on the parietal pleura is transmitted to the visceral pleura and the lung expands.

This mechanism has been ill understood for want of proper appreciation of the elastic properties of the lung. Were the lungs non-distensible like the liver, no force directed at the enlargement of the thorax would succeed in its purpose. It is an impossible task to attempt to enlarge any solid body in all its diameters by mere traction in all directions. Thermal and not mechanical forces are necessary to do that. In the new-born babe the moment the thorax begins to expand, the lung simultaneously enlarges *pari passu* and air commences to flow into the enlarging alveoli. These three events are interdependent and for practical purposes synchronous. Were the lung non-elastic, no expansion of the chest could take place and no air would flow into the lung. Similarly, if air could not flow into the respiratory passages, as may actually occur when they are filled with mucus, neither the thorax nor the lung could expand and breathing could not take place. As the expanding chest wall moves upwards and outwards, the visceral layer of the pleura remains attached to the parietal layer, sliding laterally on it but never separating. This phenomenon appears mysterious on first reflection, but all mystery vanishes if we remember that the lung is capable of distension with air. If the lung were a rigid, solid body, covered on its periphery with pleura, and some great force were applied to part of the chest wall in an outward direction, it is just possible to imagine that the thorax might be pulled away from the lung, leaving a vacuum between the parietal and visceral layers. But Nature, it is said, detests a vacuum and why should she ignore a life-long prejudice when she has not a solid but an expansile organ to fill the vacuum and plenty of air to fill the expansile organ?

It is the pressure of the atmosphere within the lung which (at least in the main) keeps the pleural surfaces in contact. These surfaces glide freely over one another as the lungs expand and contract during respiration, but they never separate. If vaseline be smeared on the smooth under surface of a sheet of glass, a coin pressed hard on that surface so as to exclude all air will remain attached against the influence of gravity. The atmosphere acting on

the under surface of the coin keeps it pressed closely against the glass. Similarly, the glass may be moved up and down vertically and sustain even considerable weights attached to its under surface, provided no air enters between the weight and the glass. In this experiment if we substitute the glass for the chest wall and the weight for the visceral pleura, it is not difficult to understand why the parietal and visceral layers of the pleura remain in contact but are free to slide on one another.

The late William Macewen denied the adequacy of this explanation¹ and maintained that the force keeping the pleural surfaces in contact was molecular cohesion. That molecular forces exert some influence in keeping the pleural surfaces together is no doubt true, but this influence is not appreciable. Macewen appeared to suggest that the molecules of the opposing pleural surfaces attract one another. But molecular cohesion requires that the molecules be in contact. The pleural surfaces are separated by a thin layer of serous fluid and although cohesion exists between the surface molecules of the opposing pleural surfaces attract one another, no molecular forces of any importance interact between the two pleural surfaces. That molecular cohesion is not an appreciable force holding the pleural surfaces in contact is suggested by the ease with which the surfaces move on one another during quiet breathing. A molecule exerts a similar attraction on all the molecules surrounding it and if molecular cohesion kept the pleural surfaces in contact, it would surely not allow them to move laterally on one another. The ease with which the finger can wipe a serous fluid off a membrane is evidence of the small attraction existing between the dissimilar molecules. The cohesive forces between the molecules of two solid bodies in intimate contact are of a different order. A physicist has cut the surfaces of twelve cubes so true that when placed vertically on one another it was almost impossible to separate them. They adhered so well as to make one mass and could be laid horizontally, a much greater force than either atmospheric pressure or gravity being necessary to separate them. Macewen stated that if two surfaces of glass optically perfect were placed in contact, molecular cohesion would prevent their separation. So true is this statement that theoretically it would be necessary to saw through the junction to effect a separation. Nor would lateral displacement of the surfaces be possible. No such cohesion exists in the pleura. If it did exist, expansion of the chest wall and lungs could not occur.

Intra-Pulmonary Tension.

The alveolar surfaces of the lungs are subjected to the pressure of the air which they enclose. During inspiration the lungs expand and the contained air becomes rarefied. The intra-pulmonary pressure becomes less than that of the atmosphere and air flows into the lungs to maintain equilibrium. During expiration the lungs recoil, the air within them becomes compressed under a tension higher

¹ Australasian Medical Congress: Transactions of the First Session, 1923.

than that of the atmosphere and air flows out of the lungs. Thus the tension of air within the lungs is a continuously varying quantity, being less than 760 millimetres of mercury during inspiration and greater than 760 millimetres during expiration (see Figure I.—A). In the so-called static period of respiration, that is, after inspiration has ended and before expiration begins, the intra-pulmonary pressure is equivalent to the tension of the atmosphere.

Intra-Pleural Tension.

The pleural sac is a potential cavity only. It is air-free and more or less protected from the pressure of the external atmosphere by the resistant chest wall. As the pleural surfaces are in contact, any pressure exerted on the walls of the peripheral alveoli will be transmitted to the two layers of the pleura and thus to the inner surface of the chest wall. Thus, if the only force acting within the chest were that of atmospheric pressure, the tension within the pleura would be equivalent to the tension within the lungs.

But the lung is an elastic organ maintaining a certain resistance to inflation. The intra-pulmonary pressure is therefore opposed by a tension due to the ever-present tendency of the lung to recoil. This tension is small. It has been estimated as equivalent to 7.5 millimetres of mercury. A manometer was tied tightly in the trachea of a person recently dead and the thorax was opened. The admission of the atmosphere into the previously air-free pleural sac counter-balanced the atmosphere already present in the lung, leaving the lung free to recoil by virtue of its elasticity. The rise of mercury in the manometer indicated the elastic tension of the inflated lung.

This tendency of the lung to retreat from the chest wall, ever present, in health ever ineffectual, has the effect of decreasing the pressure on the serous surfaces of the pleura (see Figure II.). The lungs, forced into a state of elastic tension by their inflation with air, may be viewed as ever tending to collapse, but unable to do so because the external atmosphere is prevented from acting on their pleural surfaces by the more or less resistant thoracic wall.

Compared with the intra-pulmonary pressure, the intra-pleural pressure is in health always "negative," that is, the pressure within the pleural sac is always

less than the pressure within the lungs. Now the elasticity of the lungs varies with the degree of inflation. At the end of inspiration the tension is greatest; at the end of expiration, it is least but still considerable. During inspiration, then, as the intra-pulmonary pressure decreases, the elastic pull of the lungs increases and during expiration the reverse holds true (see Figure I.—B). If, at the end of inspiration when the intra-pulmonary pressure amounts to 760 millimetres of mercury, the elastic tension of the stretched lung is equivalent to nine millimetres, then the actual pressure within the pleura is 751 millimetres. The so-called negative pressure is nine millimetres. In other words, the negative tension within the pleura is equivalent and due to the elastic tension of the lung.

This latter statement, however, is not quite accurate. The negative intra-pleural tension is mainly due to the elasticity of the lungs, but partly also to the ever-present tendency of the thorax to enlarge

slightly beyond its capacity at the end of inspiration. As a child grows, the thoracic box enlarges somewhat more rapidly than the lungs and the inspiratory muscles tend to shorten. The elasticity of the chest wall is therefore constantly tending to make the thorax expand. During inspiration the only force to be overcome is that due to the elastic traction of the lungs. But while the elasticity of the lungs tends to make the chest contract, the elastic tension of the chest wall is doing its utmost to make it expand. This has been demonstrated by making

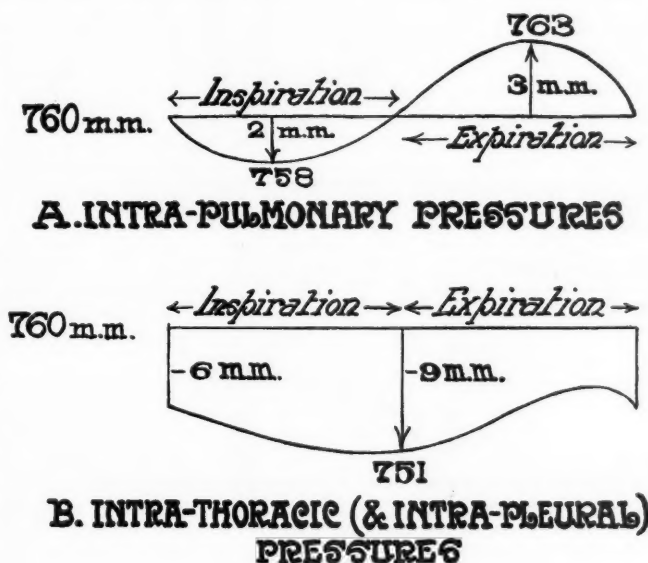


FIGURE I.
Showing the Changes in the Intra-Pulmonary and in the Intra-Thoracic and Intra-Pleural Pressures during Inspiration and Expiration (After Brubaker).

an incision in the chest wall of the cadaver. The thoracic wall is thus released from the traction of the lungs and is found to expand two or three millimetres. Doubtless in advanced emphysema, as the elastic function of the lungs becomes lost, the enlargement of the thorax is partially due to this elastic pull outwards of the chest wall.

Intra-Thoracic Tension.

Hitherto we have considered the pressure within that part of the pleural sac which is in apposition with the chest wall. But the sac extends as well on the mediastinal aspect of the lungs where it is in contact with the heart and great vessels and on the inferior aspect where it is in apposition with the

diaphragm. The same principles apply exactly in these situations (see Figure II). In the thorax (mediastinum) the heart, vessels and thoracic duct are subjected to the pressure of air within the lungs minus the elastic tension due to the pulmonary inflation. Thus the intra-thoracic pressure is equivalent to the intra-pleural and both are negative to the pressure within the lungs.

The importance of the negative tension within the thorax in its relation to the circulation is seldom adequately realized. The vessels of the body outside the chest are subjected to atmospheric pressure, not directly but through the mediation of the skin, fat and other tissues in which they lie. In the thorax, on the other hand, the pressure on the heart and great vessels is always less than that of the atmosphere within the lungs. As a result there is a constant suction of blood towards the heart. The contraction of the heart-chambers during systole must supersede this force before blood can leave the thorax, but during diastole the suction of blood to the right and left auricles resumes sway. If a surgeon cuts by misadventure a very large vein, air at once rushes in with the right auricle as destination.

Since the negative intra-thoracic tension is due to the elasticity of the lungs and since this elastic traction is greatest at the end of inspiration, the aspiration of blood to the heart is greatest during this period. When, however, during forced expiration the intra-pulmonary pressure is raised very considerably above that of the atmosphere, the tension within the mediastinum, though still "negative" to that within the lungs, is "positive" to the pressure of the external atmosphere. The aspirating function of the heart is temporarily in abeyance and blood can only enter the chest under a positive pressure. If this experiment be performed before a mirror, the distended superficial veins of the neck will be readily visible. Sir James Barr relates that in carrying out Valsalva's experiment (after a forced inspiration, making a forced expiration with the mouth and nostrils closed) he was able to raise his intra-thoracic pressure 100 millimetres of mercury above that of the atmosphere.

"This," he states, "is sufficient to shut out all blood from entering the chest; if the chest were laid freely open under such conditions, the lung would bulge through the opening. After a few beats the pulse disappears in all the superficial arteries although the vessels remain full and it is very interesting to watch through the X-ray screen the reduction in the size of the heart until finally it does not appear half its former size."

PART II.

THE MECHANICS OF RESPIRATION IN DISEASE.

Chronic Bronchitis and Emphysema.

In a report of case published in this Journal¹ I described at some length the mechanical changes in the chest caused by progressive bronchitis and

emphysema. In this condition the lungs become over-distended with air. In the early stages of the disease air is sucked in with little difficulty, but its exit is accomplished with considerable obstruction. Hence expiration is prolonged. The over-distension of the lungs with the captive air gradually destroys their elasticity and the negative tension in the thorax and pleura becomes less and less. As the elastic pull of the lungs diminishes the thorax is free to expand more and more till ultimately it is almost immovable in the position of forced inspiration. A patient with this advanced condition might (theoretically)

have an incision made into the pleural sac without any resulting collapse of the ballooned lungs owing to the destruction of their over-stretched elastic fibres. Such a patient is incapable of respiration in the true sense of the word, the interchange of gases within the lungs being carried on largely by diffusion, although the diaphragm fights to the last in an effort to maintain the respiratory pump. He is cyanosed, partly as a result of the anoxæmia produced by the failure of the respiratory mechanism, partly because the aspirating function of the thorax on the circulation is out of action. On the slightest effort he becomes livid and the large, distended, superficial veins of his neck may be easily observed.

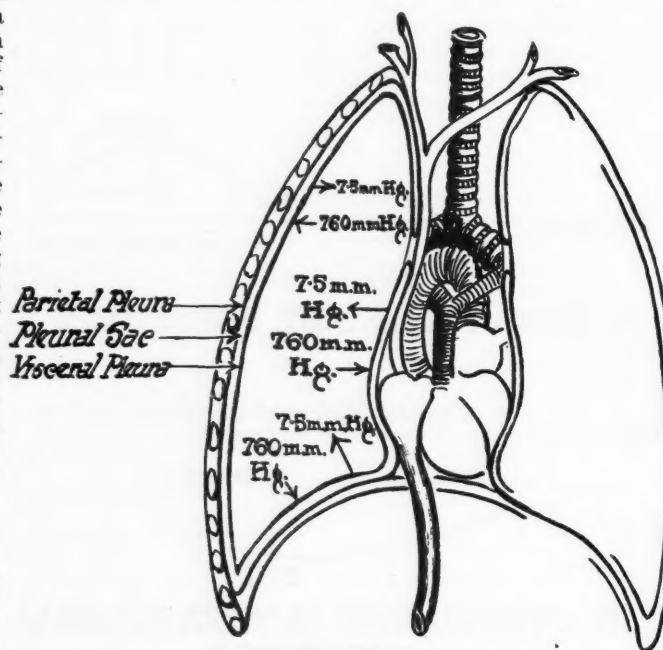


FIGURE II.

Schematic View of the Thorax of a Dog, Showing the Lungs, Heart and Chief Blood Vessels. The pressures are to be assumed as those existing in the human subject at the end of inspiration.

¹ THE MEDICAL JOURNAL OF AUSTRALIA, April 21, 1923.

Theoretically, as the chest cannot expand without expansion of the lungs and *vice versa*, destruction of the elasticity of the one leads to loss of elasticity of the other. In old age calcification of the costal cartilages renders the chest wall inelastic and the lungs consequently lose their elastic traction as the result of disuse ("small-lunged" emphysema).

Asthma.

During a paroxysm of asthma, the spasm of the bronchioles offers definite obstruction both to the exit and entrance of air. Inspiration being a strong muscular act and expiration a recoil, inflation of the lungs becomes more easy of accomplishment than deflation. The lungs therefore pass rapidly into a state of acute emphysema. To produce more efficient aeration the patient is soon forced to make violent inspiratory efforts, but as the bronchial spasm increases, these also become progressively ineffective. Hence with each convulsive effort at inspiration, the pressure within the lungs unable to fill with air becomes greatly negative to the atmospheric pressure. The supra-clavicular fossæ become deepened and the intercostal spaces indrawn. During attempts at expiration the intra-pulmonary tension cannot rise sufficiently to overcome the spasmodic contraction of the bronchi. The intra-pleural negative pressure is gradually abolished, leaving the thoracic wall free to hold the chest in the position of forced inspiration.

In severe cases the anoxæmia is profound and the patient may appear moribund from exhaustion. But before death can take place, the spasm relaxes, the elasticity of the lungs is restored and normal health is resumed.

Pneumonia.

In unilateral lobar pneumonia the lung of the affected side loses its elasticity as a result of consolidation. The negative tension in the pleura is reduced, but for a while at least is not abolished, the elastic chest wall expanding slightly outwards, thus maintaining a slight negative tension. But soon the inflammatory swelling of the lung increases, the pleural pressure becomes positive and the lung may be pressed firmly against the thoracic wall. Any pleuritic exudate will also raise the pleural pressure above that of the atmosphere and *post mortem* the heavy markings of the ribs on the consolidated tissue may be well seen.

Pulmonary Tuberculosis.

The mechanical conditions within the chest in pulmonary tuberculosis are determined by the degree of caseation of the lungs, the extent of fibrosis of the lungs and pleura and by the attendant localized emphysema. The respiratory excursion of the chest wall is diminished over the lobe or lung chiefly involved and in advanced stages of the disease there is little movement of the chest wall on either side. The mechanical (not the pathological) conditions approach those of atrophic emphysema, but with inequality on the two sides. The accessory muscles of inspiration do their best to expand the

but little expansile lungs. In health the lung bears to the thoracic wall the relation so fondly described in the ultra-modern novel. She yields under protest. But when entangled in the fibrous meshes of tuberculosis, she is lover turned virago. The chest finds itself less and less able to expand against the dominant inelastic resistance of the fibrosed lung. Thick adhesions between the parietal and visceral layers of the pleura still further increase the thoracic captivity. The negative tension in the pleura is reduced but seldom destroyed and as tuberculosis is usually a bilateral disease, the displacement of the mediastinum is seldom appreciable.

Pneumothorax.

When spontaneous pneumothorax takes place, the tension within the pleura ceases to be negative. It may and often does become positive. If the opening be free, allowing air to pass readily to and from the pleural sac during respiration, the intra-pleural tension becomes equal to the intra-pulmonary or nearly so, for the lung, if not completely collapsed, may still have preserved some of its elasticity, allowing a slight negative traction in the pleural sac.

When, on the other hand, each gust of air enters the pleura like an unwelcome guest, anxious to come but loth to go, as frequently occurs when the opening is valvular, the chest wall compresses the imprisoned air during expiration and the intra-pleural pressure is raised to such an extent as further to collapse the lung.

In all cases of pneumothorax the heart is displaced to the opposite side. Whether it is "drawn" or "pushed" depends on the amount of air within the pleura. When air can freely pass in and out of the pleura, the negative tension is destroyed but not made positive on the affected side. The unopposed traction of the healthy lung pulls the mediastinum away from the collapsing lung. When the opening is valvular the positive tension in the pleura has the effect of pushing the heart towards the healthy side still further. This dislocation of the heart and blood vessels with its attendant shock to the circulation renders the condition of the patient precarious. His violent dyspnoea and anxious look bear eloquent witness to his danger. A trocar inserted into the affected side gives relief by aspiration of the imprisoned air, depression of the positive pressure and consequent partial restoration of the mediastinum to its accustomed position.

Pleurisy with Effusion.

From a consideration of Figure II. it is obvious that a pressure of at least an atmosphere in the pleural sac is necessary to cause collapse of a lung. When the atmosphere within the lung is counterbalanced by an equivalent pressure in the pleural sac, the lung is free to collapse by virtue of its own power of elastic recoil.

As the exudate of pleurisy forms it gravitates to the bottom of the pleural sac and the lower lobe of the lung is the first to become collapsed. The negative tension in the pleura gets less and less and the heart and blood vessels are gradually pulled over to

the opposite side by the unopposed elasticity of the healthy lung. Later, as the exudate floods the pleura, the pleural tension becomes positive, the lung may be entirely collapsed, the diaphragm pushed downwards by the weight of the fluid and the heart further dislocated to the opposite side.

In a young person with elastic thoracic wall and a resilient lung not yet afflicted with the inertia of senescence, the removal of the effused fluid by paracentesis may not be a dangerous expedient, provided the effusion is not excessive and has not been existent over-long. But in the aged tapping may be perilous. The immobility of the chest wall and the inelasticity of the lung may prevent the obliteration of the pleural space when the fluid is removed. The negative tension in the potential or actual sac may then become so great that the heart is pulled rudely towards the affected side and intense congestion of the lungs may occur in a wild effort to obliterate the space.

There remain for consideration a few diseases of infancy which shed considerable light on the forces acting within and without the chest wall.

Post-Nasal Adenitis.

A child afflicted with adenoids cannot breathe freely through the nose. The intra-nasal pressure becomes less than the intra-oral and as a result the *ala nasi* become "pinched," the bridge of the nose flattened and the palatal vault acutely arched. Partial obstruction exists to the entrance of air into the lungs and accordingly during inspiration the intra-pulmonary pressure becomes greatly reduced. When these conditions continue over a prolonged period, the pressure of the external atmosphere on the chest wall prevents its proper development. The chest becomes long and narrow and in rachitic children the parietes on either side of the sternum may cave in, the sternum itself becoming carinated.

Laryngeal Diphtheria.

Acute obstruction of the larynx, whether due to diphtheria or *laryngismus stridulus*, causes characteristic stridor and recession of the chest wall. During inspiration the intra-pulmonary pressure is so greatly reduced that the lower ribs and lower end of the sternum become in-driven and the diaphragm arched upwards by the atmospheric pressure acting on its lower surface through the medium of the abdominal wall and viscera.

Pertussis.

The paroxysm of whooping cough begins with a quick, deep inspiration, followed by a succession of short coughs. The rapid series of forced expirations past a spasmodic glottis raises the intra-pulmonary and intra-thoracic pressures enormously. The return of blood to the chest is impossible. The face becomes livid, the superficial veins engorged and the dyspnoea distressing to behold. Hæmorrhages commonly ensue. The lung is gradually depleted of air, but suddenly the spasm is relaxed, a long characteristic crowing inspiration takes place and the lungs become once more filled with air. The compression of the chest during the bout of cough-

ing and the in-drawing during the long inspiratory phase may cause permanent deformity of the chest wall.

AN INVESTIGATION OF THE REACTIONS OF ANIMAL TISSUES EXPOSED TO MONOCHROMATIC X-RAYS OF DIFFERENT WAVE LENGTHS.

By W. MOPPETT, M.B., Ch.M. (Sydney),
Sydney.

THE object of the experiment was to prove or disprove the existence of differential action of rays of varying wave length on animal tissues and, if such an action were found, to establish a definite relation between the wave length used and the biological effect.

The Nature of the Investigation.

The X-ray spectrometer as used by Bragg was adapted so that approximately equal energy was employed for each wave length. The material consisted of the chorio-allantoic membrane of eight day chick embryos. The investigation consisted in adapting the spectrometer to biological purposes and obtaining and proving X-ray effects and in ascertaining whether such effects occurred uniformly or selectively at certain wave lengths.

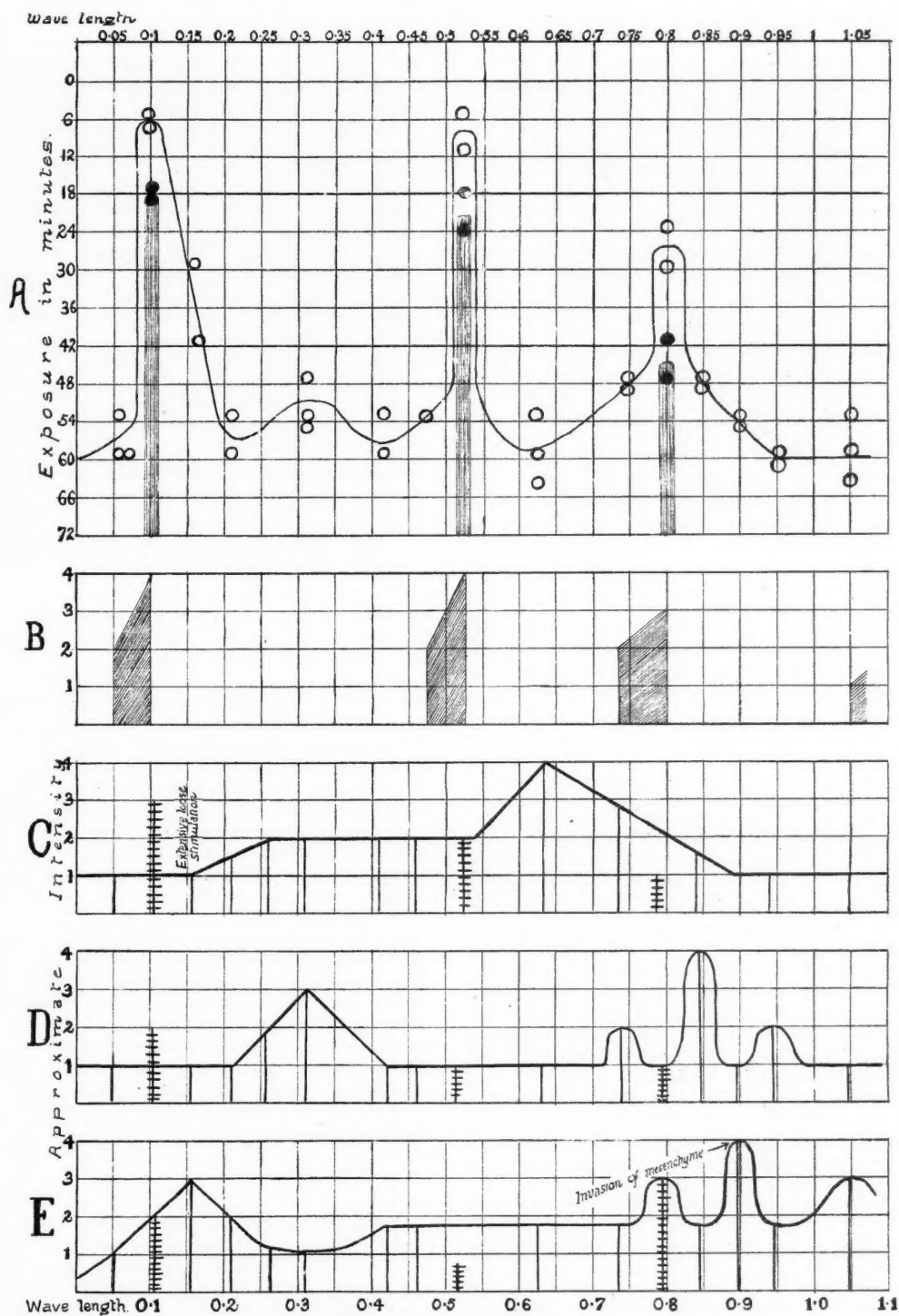
A method was devised of estimating the intensity of the response and the results were expressed graphically.

Apparatus.

The X-ray spectrometer provides the most accurate and precise means of obtaining a range of nearly monochromatic X-rays. It depends on the principle of reflection or rather diffraction by the regular atomic planes of a crystal. Now the wave length of the so-called reflected beam is given by the formula $L = 2d \sin \theta$, where θ is the angle of reflection and d the spacing of the atomic planes, a quantity which has been worked out with great accuracy by Bragg and others. In other words we have an accurate means of measuring the wave length used in terms of the angular rotation of the crystal. The tube is enclosed in a lead box, a narrow pencil of rays emerging from an adjustable slit a by which the energy used, was controlled. The crystal, a specimen of calcite, is mounted to revolve on a graduated scale and the so-called reflected beam passes through a second slit b which was left constant. The ionization method of intensity measurement was used; the chamber was fifteen centimetres long and was filled with air. The ionization currents were estimated by a gold leaf electroscope.

Energy and Absorption.

In any search for differential action as to wave length the intensity of each pencil of rays must be accurately known. For the range of wave lengths used the intensity as recorded by the ionization current was made approximately equal for each experiment, chiefly by opening up or stopping down slit a (it is generally admitted that the ionization method is the most correct means of comparing the energy of different wave lengths). The tube gave a fairly even range of "white" radiation which greatly



Graph illustrating Dr. Moppett's article.

assisted matters; slit *b* was left constant so that the energy per unit area should be constant.

In connexion with energy the question of absorption must be considered. An effort was made to secure that the column of air in the ionization chamber and the living membrane should have equal absorptive powers. Sources of scattered radiation were also reproduced approximately in the two conditions. Thus the ionization current is a measure both of the dose directed at the membrane and that actually absorbed for each degree of hardness employed. It is probable that where selective action occurs, it will be found to be accompanied by selective absorption, but the difference to be detected is probably very minute.

Material.

The chorio-allantoic membrane which forms the breathing organ of the embryo, is just applied to its full extent to the shell or rather to the shell membrane which lines the shell at eight-day incubation and that period was chosen for the experiment. The membrane consists of two layers of epithelium enclosing a vascular mesenchyme which contains a variety of amoeboid wandering cells, lymphocytes, haemoblasts and other cells and is the site of intra-vascular and extra-vascular haematopoiesis. Thus quite a variety of embryonic tissues is provided for investigation.

The ideal condition would be to let the rays pass through the shell on to a normal and undisturbed membrane. This was found impracticable owing to the relatively high absorptive and scattering properties of the shell. An oblong window of shell was removed (well beyond the limit of slit *b*) leaving the fibrous shell membrane intact to protect the living membrane applied to it. This was found to be quite satisfactory. After the ionization had been estimated, the chamber was removed and a heated box for the egg placed behind slit *b* in its stead. After radiation the shell window was replaced and sealed and the specimen incubated for a further four days to allow fibrosis or other visible change time to develop. The shell was then cut in half and the contents "poured out," exposing the irradiated area *in situ*. In the subsequent histological treatment of the reaction the shell membrane was left in contact with the delicate living membrane to support it, considerable difficulties being encountered. The embryo itself was not preserved as its mobility and the narrow pencil of rays used would render observation useless.

Preliminary Experiments.

A series of preliminary experiments was made and it was determined that the opening or closing of the shell in the manner described, if done with sufficient care, gives rise to no visible reaction which might be confused with the X-ray effect; it was taken as a criterion of successful experiment that an X-ray effect should be surrounded on all sides by normal membrane continuous over the saw cuts in the shell, a situation where slight traumatic reactions are very liable to occur. It was ascertained that the membrane does not move appreciably from eight to twelve days' incubation, so that

measurements of the extent and situation of the X-ray effect could be relied on. Accurate technique is necessary as the various manipulations and the X-rays themselves greatly prejudice the survival of the specimen, a fact which was noted especially in the measurements of intense X-ray effect.

A typical X-ray effect is depressed, fibrous, atrophic and devoid of blood vessels in striking contrast to inflammatory reactions; the dull yellow of complete atrophy stands out with remarkable clarity against the pink vascular membrane surrounding it on first opening. The contour of slit *b* is also accurately defined by the effect, a fact which when duplicated is conclusive of X-ray reaction. It was found that an exposure of the order of two hours would be necessary to obtain a satisfactory effect in the feebly reflected beam. In order to keep the tube cool the exposure was made up of twelve separate six-minute entities, alternating with four-minute periods of rest, so that in all the specimen received seventy-two minutes' actual exposure, spread out over two hours, this owing to the probability action of X-rays is nearly as effective as two hours of continuous exposure for biological purposes.

Experiment.

In the systematic experiments with monochromatic rays exposures were first made at 1°, 2°, 3° up to 10° crystal reflection, this being the limit for which the required energy factor could be obtained. When they had been sufficiently verified, certain intermediate exposures at half-degree intervals were made to confirm various points. Owing to the long exposure required, a means was devised of obtaining the equivalent of twelve separate exposures on one egg by means of a moving screen attached to slit *b*. At first the full slit or an area of two millimetres by twelve millimetres was exposed, but after each six minutes' radiation the screen was lowered one millimetre, so that only the bottom millimetre of slit *b* received the maximum dose of seventy-two minutes (for with equal energy the dose varies as the time for all experiments).

Thus the intensity of any effect that occurred, should be measured in terms of length from the sharp maximum and this forms the basis for the construction of Graph A. The sharpness of X-ray shadows, the fixity of the membrane and the subsequent results are the criteria which have justified this method. Thus I have from one specimen the information that would otherwise require twelve separate experiments and if properly verified and interpreted such information will be even more uniform and valuable than that obtained by the separate experiments.

Results.

The outstanding result of the experiment is the complete atrophy of the membrane obtained at a wave length of 0.11, 0.53 and 0.79 Ångström unit respectively. The effect is sharply restricted to these wave lengths and the greatest is at 0.11 and the least at 0.79 Ångström unit.

Referring to Figure I. which represents the atrophy at 0.79 Ångström unit, the shadow of the

ILLUSTRATIONS TO DR. MOPPETT'S ARTICLE.

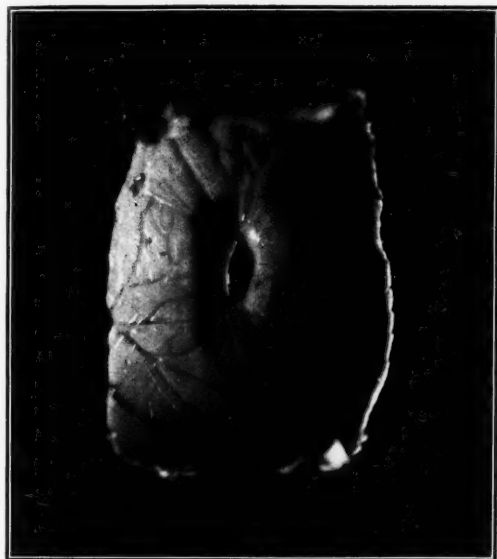


FIGURE I.
Effect at 0.79 Angström Units.
Atrophy least intense.



FIGURE II.
Effect at 0.84 Angström Units.
Hypertrophy, Peak of Leucocytosis.

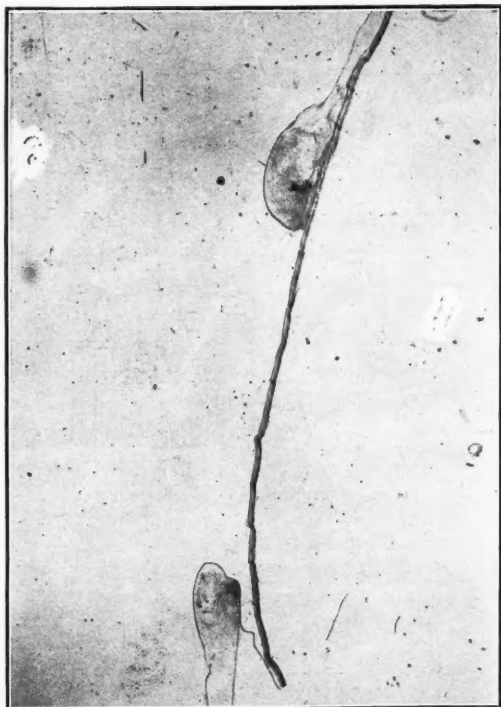


FIGURE III.
Effect at 0.79 Angström Units.
Atrophy. Section of Figure I.

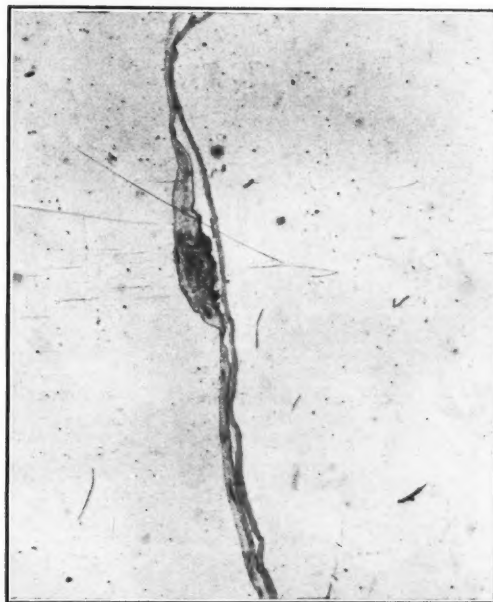


FIGURE IV.
Effect at 0.21 Angström Units.
Scattered Radiation only Effective.

ILLUSTRATIONS TO DR. MOPPETT'S ARTICLE.



FIGURE V.
Normal ($\times 125$).

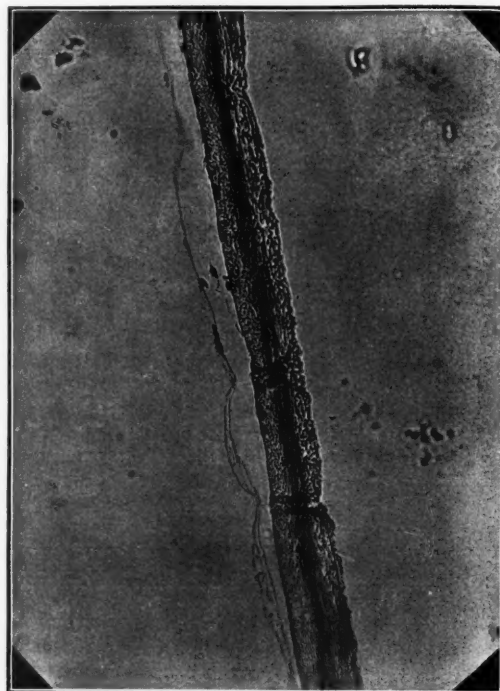


FIGURE VI.
Effect at 0.53 Angström Units.
Complete Atrophy ($\times 125$).

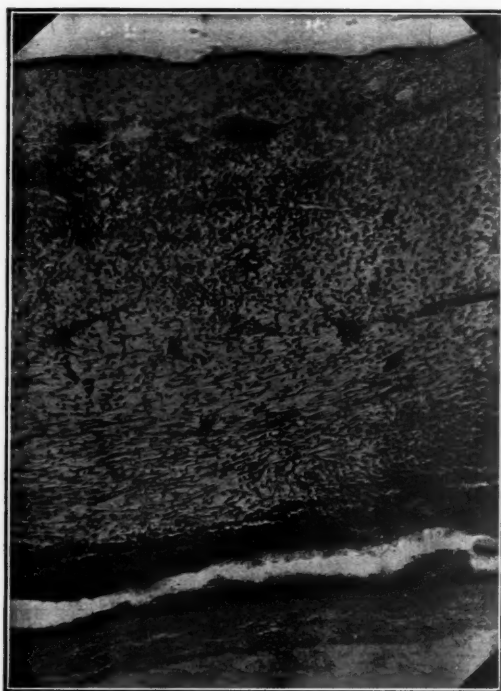


FIGURE VII.
Effect at 0.84 Angström Units.
Peak of Leucocytosis ($\times 125$), Shell Membrane below.
Compare Figure II.

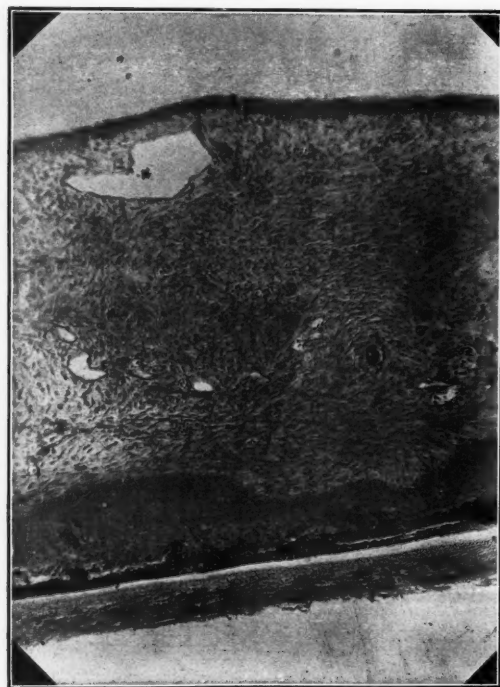


FIGURE VIII.
Effect at 0.89 Angström Units.
Peak of Epithelial Stimulation, Shell Membrane below.

operation on the shell is noted. As regards the actual effect it will be noted that the area of slit *b* is occupied by atrophy with a raised edge surrounding it. The bulge is due to shrinkage. The square base is the shadow of the bottom of slit *b* or region of maximum dosage and the rolled edge at this region and also that along the sides, are a region of stimulation due probably to scattered and therefore mixed radiation. The nodule at the "top" or minimum end of the reaction is due to monochromatic radiation. It is a hypertrophic response to a dose insufficient to produce atrophy and it will be noted that an extra six minutes' exposure determines an abrupt change from the hypertrophic to the atrophic form of reaction. The minimum end of the atrophy is narrow. This is due to the phenomenon of crystal diffraction, whereby the greatest "reflected" energy is confined within very narrow limits, but the presence of a few aberrant facets in an imperfect crystal causes a broadening of the effect up to the limits of the width of slit *b* in regions of greater intensity or dosage. Figure III. represents a section of the above specimen, taken in the long axis of the effect or in other words the long axis of slit *b* at a magnification of eight diameters. The intermediate reactions consist of small raised nodules in the regions of maximum dosage; they are of a hypertrophic character as is seen in Figure II. Certain of these "nodules" and also the rolled edge at the maxima and sides of the atrophic reactions appear to be due solely to scattered radiation. They conform to a general type in which the mesenchyme is stimulated, not to a sclerosing fibrosis but to a loose hypertrophic mass with slight lymphocytosis and discrete areas of slight fibrosis. Figure IV. illustrates a typical section of a scattered radiation nodule it was exposed to a wave length of 0.21 Ångström unit. In the case of certain other nodules which obviously extend beyond the limit of the scattered radiation effects or which present an outstanding microscopical picture, it seems reasonable to assume that in addition to the reaction caused by scattered radiation presumably present, there is a special effect due to monochromatic radiation at that wave length. I will now outline a few of these special effects.

It was found that at a wave length slightly less than that which produces atrophy, there is a remarkable partial atrophy invisible to the naked eye. This may possibly be explained in part by the reflection of slightly softer rays from atomic planes deeper in the crystal (see Graph B).

In the region of 0.16 Ångström unit a very extensive effect occurs which is of a loose myxomatous character and it would appear on present evidence to be a characteristic response to that wave length. As regards fibrous density of the "nodule" there is some variation in those specimens assumed to be due to scattered radiation, but of all the intermediate nodular reactions there appears to be a definite maximum in this respect at about 0.63 Ångström unit (see Graph C).

As regards leucocytosis there appears to be a peak of effect at 0.32 Ångström unit and again at 0.84 Ångström unit (see Figure VII.), a less intense response being noted at 0.74 and 0.95 Ångström

unit respectively; possibly many of the cells noted are immature red blood cells (see Graph D).

In regard to epithelial stimulation that next to the shell membrane or the allantoic epithelium is the most definite in its reactions. There is some stimulation in all the specimens, but for the harder rays there is a peak at 0.16 Ångström unit. For the softer rays there is a moderate response throughout, but a peak occurs at 0.89 Ångström unit. The effect here is remarkable, as not only are both layers of epithelium enormously stimulated, but the mesenchyme has been invaded by epithelial cells presenting almost a picture of a carcinoma (see Figure VIII. and Graph E).

A remarkable alteration is noted between epithelial response and leucocytosis. At 0.79 although the picture is confused by atrophy, a tendency to epithelial invasion is noted in the minimum nodule. At 0.89 the effect is at a maximum and at 1.05 Ångström units, although no invasion is apparent, a peak of stimulation occurs. Leucocytosis on the other hand is negligible in these specimens, while in the alternate experiments at 0.74 and 0.95 Ångström unit a considerable leucocyte reaction occurs and at the peak at 0.84 the epithelium has actually been invaded by leucocytes (see Figure VII. and Graphs D and E).

I have endeavoured to express some of the above facts in a graphical manner, taking such rough standards of intensity measurement as slight, moderate, maximum and in the case of epithelial thickening as a fraction of an oil immersion field. In Graph B will be found an expression of complete and partial atrophy, which together appear to be a remarkably distinct process. It will be noted that there is a partial atrophy at 1.05 Ångström units; this may be due to a second order spectrum effect from 0.53 Ångström unit or to an undiscovered atrophic reaction following.

Conclusions.

A reaction is noted in the graph at 0.055 Ångström unit; this is undoubtedly beyond the quantum limit of the voltage used, but the specimen served to confirm several points with regard to atrophy following at a slightly greater wave length. Taking the reaction at 0.11 Ångström unit as the most intense atrophic response it is noted that all elements of the membrane are destroyed approximately to an equal degree, though it must be remembered in this connexion that epithelium is profoundly influenced by subjacent mesoderm as regards nutrition and laws of growth. It is only with the intermediate nodules of relatively feeble response that the effect varies in a qualitative manner with the wave length. The regions of atrophy are very sharply defined and in certain specimens adjacent to them only the small nodules due to scattered radiation result. That is by a slight alteration of the wave length we may obtain intense atrophy or no effect at all. Figure V. shows normal membrane though it might just as well represent a membrane which has received even up to the maximum dose of radiation if we could eliminate scattering. Note the shell membrane to the right. Figure VI. shows complete atrophy; it is difficult to demonstrate

as the stains do not take. I would also draw the attention of the reader to the fact that with the above reservation Figures V., V., VII. and VIII. all represent the same membrane at the same magnification, exposed to monochromatic X-rays of equal energy but of different wave lengths.

Considering again the atrophy of 0.11 Ångström unit, this first appears after eighteen to twenty-four minutes' exposure (Graph A.). Now in that time it would be difficult to produce atrophy in the direct mixed rays and the results appear to be somewhat different. Allowing that the atrophy produced by the direct mixed rays is due only to such components as correspond to atrophy in the monochromatic ray experiments, even of these components the atoms of the crystal reflect only a minute fraction and it seems necessary to assume that in mixed radiation there are components which are antagonistic to atrophy. It is generally considered that X-rays act only by the liberation of a high speed electron and that, while hard X-rays carry the energy to a diseased region, the actual effect is due to relatively slow speed electrons corresponding to soft rays. The atrophy in these experiments, however, is so sharply defined that it appears to have a much more intimate connexion with the wave length or frequency causing it. Considering again the atrophy obtained at 0.11 Ångström unit, this wave length is much harder than that of any characteristic radiation or absorption band of any element present in living matter unless perhaps we assume a *J* series. That is the primary effect would appear to be on an electron relatively close to the nucleus of an atom. Such an effect would cause a rearrangement of the external electrons concerned with chemical properties for life is essentially a chemical process. Considering the constitution of the proteins, the atom affected must

be a light one, probably in the so-called second period containing carbon, nitrogen and oxygen, the building blocks of life. We may equate the energy of a radiation corresponding to the atrophy at 0.11 Ångström unit to the work necessary to remove an electron to infinity from an orbit whose major axis is $2a$ with a nuclear charge of N .

$$hu = \frac{e^2 N}{2a}$$
 where h is Planck's constant and u the frequency of the radiation and e the electronic charge.

Whence: $2a = N \times 10^{-12}$ centimetres approximately.

Giving N the value of 7 for nitrogen, the most likely atom, we obtain a value which is of the order of magnitude of the nucleus of an atom. A similar consideration would give electronic orbits corresponding to the other regions of special effect or what is just as important to the regions of no effect. There appear to be several modes of X-ray action clinically, the irritative effect as expressed by the erythema dose the remarkable lasting effect though not by any means confined to X- and γ rays and also the changing of a cell in the active stages of mitosis in such a manner that the process can never be completed. This last is a probability effect and certainly appears distinct. It is possible that the various clinical uses of X-rays as also the various effects obtained in the present experiment all correspond to stimulation by different wave lengths which in turn correspond to different atoms or to different regions of an atom in the protein molecule.

Such considerations open up a wide field of research. As far as the present experiment is concerned the objects set forth at the outset would appear to be satisfied.

The Australasian Medical Publishing Company, Limited.

THE HISTORY OF ITS DEVELOPMENT.

At the third session of the Intercolonial Medical Congress, held at Sydney in 1892, a resolution was adopted that it was desirable to found an Australasian medical journal. Four years later at the fourth session at Dunedin Dr. L. E. Barnett, one of the General Secretaries, again proposed that a medical journal to serve the colonies of Australia and New Zealand should be established. At that time the *Australasian Medical Gazette* had recently been acquired of Mr. L. Bruck by the New South Wales Branch of the British Medical Association. It was "the official organ" of all the Branches of the British Medical Association in Australia except the Victorian. The *Intercolonial Medical Journal of Australia* had been established in that year by the amalgamation of the *Australian Medical Journal* and the *Intercolonial Quarterly Journal of Medicine and Surgery of Australasia*. This journal was the "official organ" of the Victorian Branch of the British Medical Association. The *New Zealand Medical Journal*, owned by the New Zealand Branch of the British Medical Association, was being published each quarter. The proposal was made to

amalgamate the three journals, but there was considerable opposition to the fusion of the two Australian journals. Various expedients were offered to overcome the difficulties, including the formation of an Australian Medical Association. Strenuous opposition was offered by the staunch supporters of the British Medical Association to this idea. Out of a long and not very temperate discussion two definite facts emanated. The first is that in 1896 there was a clamant desire for a single medical journal to serve the profession either in Australia or in Australasia; the second is that at that time this idea could not be carried into effect unless some body were created in which the several colonies could have equal rights and powers. A committee was appointed to institute negotiations with the view to secure a fully representative medical journal for Australasia. No progress was made by this committee and the matter remained in abeyance for several years. In 1902 a renewed effort was made to establish an Australian medical association, but the majority of members would not listen to the pro-

posals and it was shelved in consequence. This was the last date at which Congress took a definite action in regard to the establishment of a federal medical journal.

The next stage in the evolution was the institution of the Federal Committee of the British Medical Association in Australia. The keen leaders in the Councils of the six Branches of the British Medical Association in Australia realized that difficulties existed only to be overcome. They were possessed of prevision and were impatient to advance along the road of progress. Discussion in the larger fields at sessions of Congress had ended in talk; action needed determination and energy. The first obstacle to be removed was that resulting from the individuality of each Branch. The constitution of the British Medical Association at that time did not provide for the establishment of a committee or council of a group of Branches. It was recognized however, that no progress would be possible until machinery were created whereby the Branches might take united action. That it was eminently desirable to create a body whose function it would be to safeguard the common interests of the Branches, was immediately apparent. Despite the lack of constitutional authority, the plan was devised for the formation of a Federal Committee. Rules were drafted governing its powers and procedure and the proposals were submitted to the Central Council of the British Medical Association. Sanction was given for its establishment to the Federal Committee.

In May, 1911, the two following resolutions were sent by the newly formed Federal Committee to the Branches for consideration and approval:

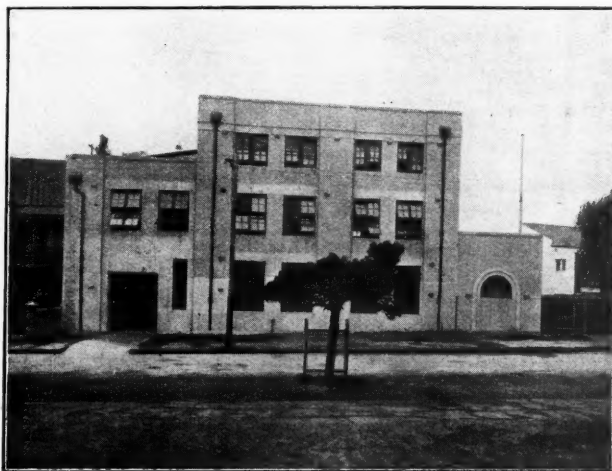
1. That in the opinion of this committee the Branches of the British Medical Association in Australia should conjointly own and conduct one weekly paper.

2. That in the opinion of this committee machinery should be provided for the Branches to combine to purchase the interests of New South Wales and Victoria in the *Australasian Medical Gazette* and the *Australian Medical Journal* respectively to conduct a weekly paper.

Negotiations were initiated between the Federal Committee and the New South Wales and the Victorian Branches which led early in 1913 to the formation of the Australasian Medical Publishing Company, Limited, and to an arrangement whereby

this company could acquire from the New South Wales Branch and from the Victorian Branch the two named journals. The company was registered in New South Wales in 1913. According to its memorandum of association its objects were to conduct, establish, print, publish and circulate newspapers, journals, magazines and other publications, literary works and undertakings and in particular a journal to be the official journal or organ of the respective Branches of the British Medical Association in Australia and New Zealand represented in the company. Many other objects were included in the memorandum, so that the company would not be hampered in the future if its activities were extended. The constitution of the company is very simple. It is a company limited by guarantee, that is without shares or other form of capital. Each Branch of the British Medical Association in Australia has the power to nominate three members. The directorate is composed of

one member representing each of the six Branches. The original Directors were: Dr. W. H. Crago (Chairman), Dr. W. Kent Hughes, Dr. W. N. Robertson, Dr. F. S. Hone, the Honourable Dr. A. Saw and Dr. Gregory Sprott. The company issued debentures to the members of the several Branches of the British Medical Association in Australia for the purpose of raising money to defray the initial expenses.



The Printing House: View of Arundel Street Frontage.

The First Stage.

The Directors determined to let a contract for printing the new journal, THE MEDICAL JOURNAL OF AUSTRALIA, to Shipping Newspapers, Limited, and to engage the services of a whole-time editor and a whole-time manager. The Manager entered upon his duties in May, 1914, and the Editor on June 4, 1914. The first issue of the new journal appeared on July 4, 1914. The printing equipment was insufficient at first and several months elapsed before founts of italics, Greek characters, proper accents and ordinary mathematical signs were available. In the course of time it became possible to respect some of the rules of correct typography, although it was not until the second stage of the development was reached that full use of these rules could be made. The price of printing and of paper before the war was relatively low and the prospect of financial success appeared to be good. The Company, however, had to pass through a succession of tribulations from the start. A calendar month after the

appearance of the first issue war broke out. The whole world was soon involved in turmoil. Many small newspapers bent under the strain and ceased to exist after a shorter or longer struggle. The MEDICAL JOURNAL OF AUSTRALIA had important functions to fulfil and the Directors realized the imperative necessity for its continued appearance. The authorities looked upon the journal as the best instrument of approach to the medical practitioners and as the needs of the Australian Army Medical Corps became more and more clamant, the journal was used almost continuously for this purpose. Repeated offers from the Editor to go on active service were refused, presumably because the uninterrupted appearance of the journal was regarded as imperative from a national point of view. There were financial difficulties in the first year. The business side of the venture had to be developed and the advertisement pages had to be exploited to their full value. The staff began in a modest way. It consisted of the Editor, the Manager and one typiste. After a short time the management was entrusted to the Editor and the services of a bookkeeper were engaged. In 1915 and 1916 the journal forged slowly ahead and began to register increasing profits. The medical profession gave its loyal support to the undertaking and the quality of the contributions offered soon attained a sufficiently high standard to compel the attention of readers not only in Australia, but also in Europe and America.

The interests and special problems of the several Branches had to be studied and safeguarded. A plan was developed for this purpose and was carried into effect as soon as it was possible. Previously the *Australasian Medical Gazette* had attempted to cope with these problems through the agency of so-called "local editors" appointed by the Councils of the Branches. The defect of this system lay in the fact that the "local editor" could not become a true liaison officer owing to the fact that he was responsible to the Branch Council and not to the *Gazette*. Representatives of THE MEDICAL JOURNAL OF AUSTRALIA were appointed in each State, after the approval of the Branch Council concerned had been obtained. During the war the selection of competent representatives was rendered difficult, owing to the fact that the choice was limited and those who remained at home were usually unable to spare time to carry out the duties. Little by

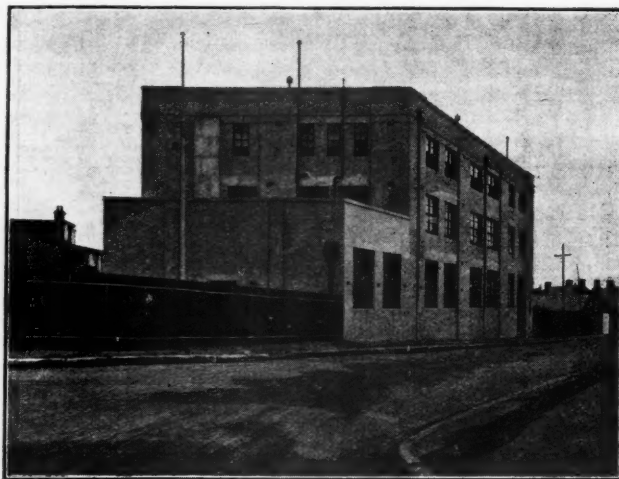
little the Branch Councils became more accustomed to the new idea and as competent representatives were appointed, the method worked to the advantage both of the Branches and of the journal. As time went on the working of the weekly issues became smoother and the opposition born of vested interests and misunderstandings weakened to a great extent. The work grew and demanded careful organization with a view to future expansion. A part-time assistant was added to the staff and the number of anonymous contributors, specialists in particular branches of medical science, was gradually increased.

The Second Stage.

In 1916 there was an acute shortage of printing paper and the authorities required those responsible for the publication of newspapers and magazines to reduce the size of their issues by one-half. At the same time the price of printing paper increased

at an alarming rate. Before the war super-calendered and mill finished paper cost between twopence halfpenny and twopence three farthings per pound. In 1918 the indent price in Sydney was as high as one shilling and fourpence a pound. Newsprint, which was formerly considerably cheaper than the better surface papers, rose to a shilling per pound and even higher. In addition the price of printing rose to a considerable height. The Directors of the Company were faced at this period

with an embarrassing situation. The first expedient adopted to ease the situation to a small degree was that of making arrangements with certain paper mills in England for the supply of a high class mill finished paper at a reasonable figure. The number of pages of reading matter in each issue was reduced. But even when this was done, the prospects were not good and it became evident that something further was needed to stem the reduction of profits. The income from advertisements could not be increased rapidly. It was held to be undesirable to require the Branches of the British Medical Association in Australia to pay a greater sum than that agreed upon in 1914 for journals supplied to the members. To reduce the size of the individual issues still further meant a fundamental disturbance of the work and a destruction of all that had been achieved. In these circumstances it was decided to instal a type-setting and composing plant. A modern linotype with an



The Printing House: View of Seamer Street Frontage.

extensive supply of matrices required for the setting of scientific matter as well as an ample outfit for the composing room, were ordered. The offices of the journal were transferred from the first floor in the B.M.A. Building, 30 to 34, Elizabeth Street, to five rooms on the fifth floor. Two of these rooms were reserved for the type-setting plant, one for the management and two for the editorial department. The cost of the installation was approximately three thousand pounds. It was decided to meet this cost out of income over a period of three years. The first issue set up by the Company's plant was published on October 8, 1921. The machining was undertaken by the Sydney and Melbourne Publishing Company, Limited. In that issue it was pointed out that the installation of this plant represented the second step in an experiment. The first step was the founding of a federal medical journal. As in all experiments it had been impossible to foresee what the results would be. The war had upset all calculations and the effects of the war on industry and social life were of a lasting character.

The experiment was successful from the start. It is true that the journal was by the time of this new move a very sound business undertaking and it had already gained recognition in other countries as well as in Australia as a scientific journal of importance. All that was needed was to adjust the difficulties arising out of increasing cost of production. The innovation, however achieved more than this. As soon as the type-setting and composing passed into the control of the staff, attention was concentrated on the manner of presentation of the material. The equipment sufficed for every emergency and great pains were taken to follow all the rules of correct typography. Larger issues were published at a very small additional cost. The Directors had the satisfaction of being in a position to meet every bill connected with the purchase of the plant as it fell due. There was, however, one serious defect in the arrangements. The staff at this stage comprised the Editor and Manager, the Assistant Editor (at first part-time, later half-time and later still whole-time), a secretary to the editors, a book-keeper, one linotype operator, one compositor and one apprentice. There was therefore a grave danger in case of illness or accident of a breakdown. Moreover, the cramped conditions and the very narrow margin of safety in regard to the capacity of the one man

in each department compelled the Directors to realize that the second stage could only be a temporary measure.

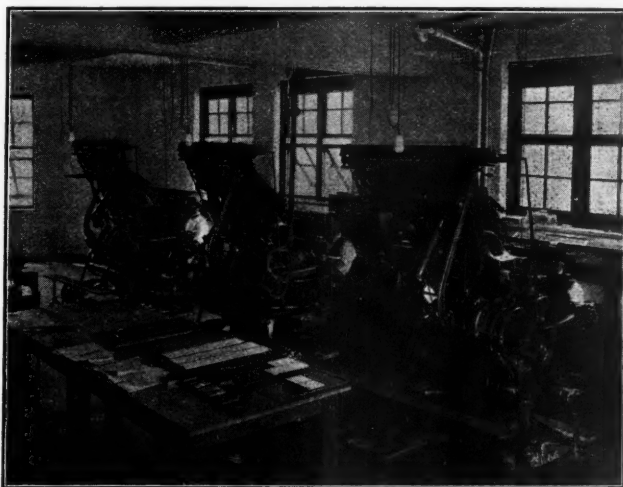
In 1922 the proposal was laid before the Directors that the printing activities should be extended and that the Company should acquire its own complete printing plant and produce not only THE MEDICAL JOURNAL OF AUSTRALIA, but also other scientific matter. After consideration the Directors instructed the Manager to prepare a full report on the scheme. This scheme was examined with care and was referred to L. S. Drummond and Company, a well-known firm of chartered accountants, for investigation. Mr. Coates, the senior partner of L. S. Drummond and Company, reported favourably on the scheme. The first proposal was that the sum of £10,000 should be raised by debentures for the purpose of purchasing plant and equipment. At the same time as the scheme was submitted to the accountants, it was sent to the six Branches of the

British Medical Association in Australia in order that the amount of support it would receive, might be ascertained. The Editor-Manager attended several of the meetings of the Branches at which the scheme was considered and explained the details. In the course of these discussions, Dr. George Armstrong put forward the suggestion that the amount should be increased for the purpose of enabling the Company to acquire its own printing premises. The Directors ap-

proved of this alteration and determined to increase the issue of debentures from £10,000 to £15,000. All the Branches passed resolutions indicating their interest and approval of the extension scheme. Almost immediately after this stage was reached the journal became involved in a libel suit and in consequence the scheme was temporarily abandoned.

The Third Stage.

Even legal proceedings come to an end after the lapse of time. The journal unfortunately lost the suit and was mulcted in damages to the extent of £1,000. The costs of the case amounted to over £4,000. Arrangements were made to meet these heavy expenses and within a few weeks they were complete. The Directors then invited the members of the several Branches to take up debentures to the amount of £15,000 at 10%. A closing date was fixed and by that date (July 1, 1924) applications for £17,500 had been received; as each Branch reached



The Printing House: View of the Linotypes.

its quota, inquiries were made whether more would be required. No applicant was refused; the larger amounts were reduced, so that the £15,000 was collected.

In the meantime a site had been discovered and secured. It comprised a plot of vacant land of nearly triangular shape situated in the highest part of Glebe in the immediate neighbourhood of the University of Sydney. The apex of the plot, measuring sixteen feet (to be consistent we should give it as 4.9 metres) faces Arundel Terrace to the east-north-east; the south-west border has a frontage of one hundred and thirty-three feet (40.5 metres) in Arundel Street; the north-east side has a frontage of one hundred and twelve feet (thirty-four metres) in Seamer Street; the base measures eighty-five feet (twenty-six metres). The site cannot be robbed of its free access of air and light by any subsequent building, for its substantial height above the Parramatta Road which separates it from the eastern side of the University, and the absence of building land, endows it with this valuable character. Colonel H. B. Vernon (of Vernon and Mills), an architect of eminence, was engaged to draw up the plans for a building of three storeys. It was determined to leave the apex uncovered by building. The ground floor which is used as the machine room, and the first floor which is the composing room, are spacious apartments, having a floor area of about three thousand six hundred square feet (three hundred and thirty-eight square metres). The entrance is placed in Seamer Street, while the goods entrance is in Arundel Street.

A contract was let with Mr. Max Cooper for the erection of a reinforced concrete and brick building to be complete on January 15, 1925. The building operations were started in August, 1924. The laying of the foundation tablet was performed by Dr. W. N. Robertson, Chairman of Directors, on July 16, 1924 (see *THE MEDICAL JOURNAL OF AUSTRALIA*, July 26, 1924, page 100). In this way it was inevitable that during the first six months the debenture money could not be used in producing revenue. The Directors propose to pay interest from the time the debentures were issued.

As soon as the foundation was laid, orders were given for modern printing machinery and equipment. Much care was exercised in the selection of each piece of machinery, while the equipment, fur-

nishing and general arrangements received a great deal of thought and consideration. In this work and in the task of selecting additional members of the printing staff the opinion of competent judges was sought and obtained. The manager wishes in this place to acknowledge his indebtedness to Mr. L. L. Frank, of Carmichael and Company, Limited, and to the officials of the Printing Industry Employees' Union of Australia for much valuable advice and assistance. It was arranged that the machinery and equipment should be installed on or about January 15, 1925, and that the staff should start work in the new premises very shortly after that date. There were, however, many delays in the building operations. Some of these were caused by the failure of the Electricity Department of the Municipality of Sydney to provide electrical power when it was required. Sufficient progress had been made by the end of January for the printing presses and two linotypes to be erected. It was not until

March 11, 1925, that the machinery and equipment could be moved from Elizabeth Street to the new premises. The first issue of the journal printed entirely by the company is dated March 21, 1925. The folding machine had arrived a few days previously, but was not ready for use. It was therefore necessary to fold some of the sheets by hand, a time-robbing and expensive expedient. Many adjustments had to be made in the new machines and it was only by the splendid deter-

mination and strenuous effort of every member of the printing staff that the first and second issues could be produced without undue delay. The appearance of the journal was altered by the inclusion of the figure of *Æsculapius* copied from the Gold Medal of the British Medical Association in Australia on the cover. The printing was much better than it had been before, but was not at its best, owing to the difficulties inseparably associated with the first working of complicated machines.

The Printing House.

As has been mentioned above the whole of the ground floor of "The Printing House" comprises the machine room. The entrance is placed at the end of the Seamer Street frontage. There is a small hall and the stairway leads to the two upper storeys. Above the door of the machine room is the marble foundation tablet. A portion of the space within the machine room is cut off to serve



The Printing House: The Composing Room.

as a cloak room and lavatory for the female members of the staff. At the opposite end there are two doors. One leads to the cloak room and lavatory for the men and the other to the lunch room, an apartment of ample dimensions for its purpose. A door in the lunch room leads to the little garden at the apex of the land.

The machine room contains two English Miehle two-revolution presses erected over pits for ready access to the under structures. One of these machines is a quad-demy machine, that is, is large enough to print sixteen pages of this journal on one side of one sheet of paper. It is provided with a Cross automatic feeding machine. By this means the paper is fed mechanically into the press at the rate of one thousand nine hundred sheets an hour. The steel bed of the machine, the cylinder and the undercarriage are constructed and finished as only an English machine of highest quality can be constructed and finished. The oiling mechanism is automatic. This machine has no compeers. The smaller Miehle press is a quad-crown, that is it can print a sheet measuring thirty inches by forty inches. It is erected for hand feeding. Each of these, as have all other machines on the premises, has its own electrical motor, starter and fuses. The sheets are fed on both machines from the centre of the room and the printed sheets are delivered on the Arundel Street side. As the windows, glazed with cathedral glass

to prevent inquisitive eyes from peering in, are large, the illumination during the day time is excellent and especially good at the delivery end. On dull days and at dusk the electric lighting is so arranged that every part of the machines can be flooded with light. A special make-ready board is placed in front of one of the Arundel Street windows to enable the machinists to prepare the overlays under the most favourable conditions. The composition rollers are kept in well constructed cupboards with devices designed to prevent sagging of the gelatine-glue clothing. There is a convenient stand for the washing of the rollers, stands for oil, benzine and petrol, for paper and for ink. All these accessory pieces of furniture throughout the building are stained and varnished, in order that they can be kept clean. At the side of the smaller printing press is a platen machine for the printing of small sheets. It is a "Craftsman" platen, a machine constructed to carry out clean and fine

work. On the opposite side of the room, almost at the same level as the platen, is the guillotine, a "Diamond." This is another British-made machine and is of first class workmanship. Close by is a small stitching machine. Lastly there is the folder, called "Autotriumph," equipped with an automatic feeding machine. In this instance the Directors were advised to purchase a German machine, because of its great superiority over all other makes of folding machines. The principle on which the folder is constructed, the stability of the stand and of the mechanical arrangements, the fineness of the adjustments, the smooth working of the automatic feeder and the accuracy of the folding register combine to place it in a class by itself. In other folders the tension of the tapes, needed for carrying the sheets from position to position as each fold is made, is adjusted by screws worked by hand. In the "Autotriumph" the tension is regulated by weights of equal value, so that it is constant and

the same throughout the whole machine. The contraption for stopping the machine should a defective sheet be inserted is a most ingenious electric device which has many advantages over the more usual contrivances attached to other machines. The blades making the actual folds work vertically and not through a segment of a circle, thus insuring a more accurate and neater fold. It is a marvellous piece of mechanical work. The Company is determined to produce the best work



The Printing House: The Machine Room.

possible with Australian workers and in consequence the best machines are needed.

The general plan of the room has been cast on logical lines. The formes are sent down from the floor above in the cage of the forme hoist on the Arundel Street wall. The formes are placed on the presses and the required number of copies is printed. The paper store is situated at the base of the room so that there is a free carriage way to the feeding end of the machines. From the presses the printed sheets are taken to the folder, thence to the large work table where they are collated and inserted, thence to the stitcher, back to the cutter and returned to the table for wrapping. Each machine and the tables and benches are placed in a good light and the sitting or standing accommodation is arranged to give the men or girls the greatest amount of comfort possible during the many operations. The ventilation of the room is good and can be varied according to the direction

of the wind. The floor is necessarily of concrete. It is kept clean and tidy by sweeping and frequent hosing. Waste paper is placed in bale sacks suspended in a suitable frame, while refuse including greasy or soiled waste is collected in a large garbage tin.

There are no girls employed on the first floor. Above the lavatory for females is the lavatory for males working in the composing room. A cubicle constructed of Pacific maple panelling provides ample room for the reader and "copy-holder." This cubicle has two large windows of the special type installed throughout the room. Both the lower and the upper halves can be opened by throwing out the lower end until the outer surface is carried considerably beyond the horizontal position. These windows can be kept open to some extent under all meteorological conditions and their position can be so adjusted that excessive draught can always be avoided without complete closure. The roof of the luncheon room is below the level of the lower end of the windows. It has therefore been possible to place windows on three sides of the composing room. The three linotype machines are arranged in a row in front of the windows looking down Arundel Terrace. All are Mergenthaler Model 14, American machines. A description of this machine with an illustration was published in this journal on October 8, 1921. There are several innovations and improvements in the

two new machines. The metal pots for holding the molten metal used for casting the "slug" or line of type, are heated by electricity. The temperature is less liable to variation than when gas is employed as the heating agent. There are no fumes and consequently no fume flue is needed. The other improvements are of a technical nature and are designed to save waste of labour and to avoid defects in running. An electrically driven trimming saw has been installed and has proved itself to be time saving and very accurate. The room contains a large stock of dust-proof cabinets for type and for blocks, bulk storage and letter board cabinets, brass rule and reglet cabinets, chase racks, working benches and trays on tilting brackets, desks and so forth. Many new founts of type have been purchased to enable the compositors to handle any kind of printing. The linotype and hand type equipment includes matrices and type of signs, symbols, accents and other characters required in all

forms of scientific printing. Within a very short time it will be the completest equipment in Australia. The Mergenthaler Linotype Company have generously undertaken to cut matrices of the unusual mathematical signs and symbols for the company. The corresponding hand type is being imported from England.

There are six imposing surfaces, that is tables with iron tops for the making up of a combination of pages to be printed on one sheet. The steel frame in which the individual pages are locked, is called a chase and the loaded chase is called a forme. Each table is large enough to carry sixteen pages of this journal imposed in one forme.

The room is eleven feet high. The walls are plastered and the floor covered with "Battleship" linoleum a quarter of an inch in thickness. The ceiling is bagged and consequently the amount of light reflecting surface is very large. As a result there is a flood of light caught up through the four-

teen large windows. The melting pot and metal bin are placed on a metal tray and the latter is constructed so that the metal is collected without loss, without untidiness and without an excessive expenditure of labour. A vacuum cleaner is used in this room.

The second storey contains the offices of the journal and of the printing department of the company and a flat, the caretaker's quarters. On the Seamer Street side there are four offices leading one into the other.

The first is the management room. The second is the Editor's room, which leads into a room for the Editor's and Assistant Editor's secretaries. The fourth room is that of the Assistant Editor. One of the three windows of this room overlooks Arundel Terrace. The view in this direction and to the north-east is very fine and very extensive. Each room is divided from its neighbour by a wall of wooden panels with glass panels above. The electric lighting is semi-indirect by means of ceiling bowls of semi-transparent glass. On the opposite side of the corridor is the management office which leads out on to a flat roof. The flat roof commands a fine view of the University and its grounds. Lastly the records room is a large room with walls lined with book shelves.

Mention should be made of the lavatory arrangements throughout the building. In each there is an adjustable looking-glass in a round metal frame, a glass tray for soap boxes, one hook for each



The Printing House: The Machine Room, Another View.

worker to hang up his or her towel, an umbrella stand, hat and coat pegs for the men and coat pegs and hat shelves for the girls. The closet seats are of the horse-shoe pattern. Tiles are used to protect the walls to a large or smaller extent, while the untiled portions are painted in white enamel.

The caretaker has two bedrooms, a living room, a spacious kitchen, a laundry and a bathroom. On the outer wall of the kitchen is a food lift communicating with the lunchroom below. Arrangements have been made for the cooking by the caretaker of food provided by the printing staff. In this way the members of the printing staff are enabled to have a satisfactory hot or cold mid-day meal at the cost of the raw materials. One of the members acts as caterer and draws up menus for the week, which are handed to the caretaker. Another acts as treasurer and collects a contribution from each member of the staff. The lunch is held to be excellent and the arrangement is appreciated.

The girl workers are given a quarter of an hour in the morning and a quarter of an hour in the afternoon to lie down on cane couches in the records room. The door is closed and they remain undisturbed during the two periods of rest. The hours worked are from quarter past eight in the morning to quarter past five in the evening, with three-quarters of an hour interval for lunch. No work is done on Saturdays.

The Prospects for the Future.

From the foregoing it will be apparent that a building costing approximately £10,000 and plant valued at over £12,000 constitute a substantial overhead burden for the company to carry. Efforts were made at an early date to secure contracts for the printing and publication of transactions of scientific societies and of journals and magazines of professional organizations. The Linnean Society of New South Wales was the first to enter into business relations with the company. The difficult printing of the Transactions of this Society is just what was being sought. The members of the printing staff are specially trained to handle this kind of material and to combine in the work correct typography, accurate scientific terminology and presentation and a pleasing neatness of the printed page. The whole is under the supervision of the Manager whose training in various branches of science and literature serves as a sort of guarantee of accuracy. Other contracts have been secured, while in some instances the company has been unsuccessful in securing a contract after having submitted tenders. Sooner or later this organization must gain general recognition as the scientific printing house of Australia, for all steps have been taken to insure competence and a high standard of accuracy. No expense has been saved either in equipping the establishment or in instituting the arrangements for the comfort and welfare of the workers. Individual medical practitioners have already placed small orders for the printing of letterheads, account forms and case cards. All this helps toward the essential first objective, namely to make the undertaking a paying concern. If the

machines are kept busy and dispatch in the working of each department is secured, it must prove a financial success. The business organization is relatively complicated, but smooth working will be attained as the result of systematic working. The printing department of the Australasian Medical Publishing Company, Limited, has come to stay. It should not be long before it is returning a substantial profit. Perhaps a further stage in the development of the company's activities may be needed in the not distant future.

Reports of Cases.

MELÆNA NEONATORUM.

By B. B. ARMSTRONG, M.B., B.S. (Melbourne),
Maffra, Victoria.

THE following case of *melæna neonatorum* may be of interest in connexion with two reported in a recent issue of the journal.

Mrs. O'C. was admitted to hospital on January 12, 1924, in labour. Pains ceased and she left the hospital to return on January 28, 1924, again in labour. The child was still-born. No movements had been felt for seven days previously and apparently the child had been dead for some days. A Wassermann test was carried out, but no reaction was obtained. The same patient was delivered of a live, healthy male child on January 22, 1925. The child weighed four kilograms (nine pounds). Forty-eight hours afterwards blood-stained mucus was vomited; at first this was slight and bright red, later on the vomiting was copious and the vomitus altered by gastric juice. Copious tarry stools were passed. They did not consist of meconium but of altered blood. The skin was cold and clammy. The blood was pale. The pulse was almost imperceptible.

The child was treated in the first place with two cubic centimetres of "Hæmoplastin," no noticeable improvement occurred. Doses of a solution of one in one thousand of adrenalin were given by mouth every four hours alternately with four cubic centimetres (one fluid drachm) of weak gelatine solution. The vomiting and *melæna* continued and ten cubic centimetres of whole blood were drawn from the mother's median basilic vein and injected subcutaneously into the baby's flank. The condition thereafter gradually improved and the baby is now quite well and strong.

When Mrs. O'C. was five months pregnant during this second pregnancy, she suffered from an attack of influenza with pleurisy and was in hospital for seven days. Four weeks after confinement she had a breast abscess. Here, as in one of the cases reported recently in the journal, there was a definite history of infection in the mother. The question arises in connexion with the intra-uterine death of the first infant, whether death was due in some way to hæmorrhage such as occurs after birth or whether the maternal blood supplies the missing link with its general nutriment and the hæmorrhage only becomes possible after separation of the child from the mother.

PATCHES OF OSSIFICATION IN THE TONSILS.

By F. CH. DE CRESPIGNY, M.B., Ch.M. (Melbourne),
Ararat, Victoria.

THE following case seems to me to be of sufficient rarity in regard to pathological conditions of the tonsils to be worth reporting.

S.H., a female, aged thirty-eight years, consulted me for chronic asthma. On examination I found definite abnormal physical signs in the lungs. Her tonsils were the seat of

chronic inflammation and the crypts were filled with plugs of caseous material commonly seen in tonsils of that type. Tonsillectomy was advised as a preliminary measure to efficient treatment and the tonsils were enucleated. On examining the tonsils after removal they were found to have a curious "shotty" feel and on section what appeared to be spicules of bone embedded in tonsillar tissue were cut. On account of this unusual finding one of the tonsils was sent to Dr. R. J. Bull for pathological report. Dr. Bull informed me that the specimen manifested chronic inflammation and definite patches of ossification in the tonsil tissue. He could find no evidence of tuberculosis or malignant disease.

I have not seen or read of true bone formation in tonsils either associated with or in the absence of chronic inflammation; this is my reason for reporting the case.

Reviews.

OPTICAL REFRACTION AND ACCOMMODATION.

ONE book on refraction is very apt to be a replica of another on the same subject, they are members of a large family with a strong family likeness. So it would be unreasonable to expect much that is new, or any great departure from the ordinary in the fifth edition of Ernest Clarke's handbook on the errors of accommodation and refraction of the eye.¹ Yet in spite of this the present volume has a distinct individuality. The author is so much in earnest. He is a refractionist in *excelsis*, a preacher of a gospel and his gospel may be summed up in his own words: "There is no functional trouble that may not be due to eye strain." Here and there he may be guilty of an exaggeration, we may not follow him all the way, but on the main issues there is no doubt his case is irrefutable. It is hard to accept that the smaller the error the more likely is eye strain to be present; it seems far-fetched to think that the wearing of glasses may prevent the advent of tuberculosis or infectious disease, but it is within the experience of all that small errors of refraction as well as large, may cause in many people untold miseries which vanish when they wear correct glasses. So we cordially endorse his *dictum* printed in the blackest of type that "the physician who is called upon to treat a so-called 'functional nerve disorder' and fails to eliminate the element of eye strain, fails in his duty both to himself and to his patient." He postulates that for the recognition of small degrees of astigmatism, the use of a cycloplegic is necessary. He may be right, though many good men claim to do equally good work without.

It seems that Helmholtz's theory of accommodation is losing ground in favour of Tscherning's. The latter maintains that the action of the ciliary muscle is to increase the tension of the suspensory ligament, thus altering the lens from a spherical to a hyperboloid form. Ernest Clarke considers that clinical signs support the new theory. The author maintains the usual doctrine that myopia is caused and increased by near work. Nowadays we are not so sure of this.

A POPULAR TEXTBOOK ON HEALTH.

In the United States of recent years there has been a steady attempt to educate the public in the aims and methods of modern medicine.

This attempt has for its object the cooperation of the public in health problems, a cooperation such as the Hookworm Campaign achieved in the infested areas of Queensland and New South Wales, a cooperation based on understanding.

The teaching begins even in the kindergarten where the habits of personal hygiene are taught as a game,

where a clown has toured the schools in the interest of the movement and a definite programme exists under the guidance of the Child Health Association of America.

Professor Sharp, Professor of Bacteriology and Preventive Medicine in the University of Texas, has written a small book on the foundation of health for junior university students.¹ It is written in simple language so that it would be an equally good book for the average educated citizen. The structure and functions of the body are shortly described, the particular ills of each are set out with emphasis on prevention and a few words on treatment.

Everywhere emphasis is laid on the necessity for trained physicians and surgeons; several paragraphs are devoted to the dangers from unqualified practitioners.

In popular works the chapter on reproduction is usually the most difficult, it is either colourless or overdrawn. Professor Sharp is rather on the colourless side, but everything is dealt with and he assumes that the student is elsewhere having lessons in "sex education."

An excellent chapter is that on the "Hazards of Childhood," another that on "Physical Exercise." The weakest is perhaps that on infection and immunity.

There is an index and an apparently extensive bibliography for wider reading, unfortunately almost entirely American.

The book would be a most useful one to any teacher or parent and the average citizen would learn much from it. The binding is attractive to the domestic cockroach, even more than is usually the case with American bindings.

RATS.

IN "Rats and How to Destroy Them" Mark Hovell, as the result of collecting notes, making experiments, inventing traps and covers for traps, devising signal systems, analysing poisons, mixing his own poisons and testing their worth, has given us an exhaustive work which embodies the experience of forty years of study.² This study is concerned with the life history, habits and the means of combating the most cunning, destructive, dangerous, prolific and ubiquitous enemy of man.

In this modern "Complete Rat Catcher" traps, runs and every sort of ledge, platform, port and cover are described with infinite pains so as to be as easily understood by the untrained as by the expert. Stress is laid on the enormous economic loss from rat infestation, estimated to amount to one million pounds sterling per week in Great Britain alone and to the danger from rat-flea borne plague, spirochaetal jaundice or rat-bite relapsing fever, trichinosis and other less common epizootics spread by rats.

In regard to clearing premises of rats emphasis is laid on making buildings rat-proof, destroying all rats on the premises and keeping steel traps set throughout the year. Mr. Hovell is apparently most experienced with the steel gin rat and rabbit trap. He does not describe the more easily set and handy break-back trap which has been so successfully used in Sydney and which accounted for over 200,000 rats in 1921 and 1922 during the plague outbreak. No reference is made to fumigation by cyanide, the most effective method of exterminating rats which in the hands of experts has not proved unusable owing to the danger.

There is an interesting note on the suggestion as to the possible transmission of cancer by the rat and cat tapeworm or other parasite of the rat. The book, although somewhat prolix, should prove of use to those specially engaged in keeping down rats and of special interest to those who suffer from their depredations.

¹ "The Foundation of Health: A Manual of Personal Hygiene for Students," by William Barnard Sharp, S.M., M.D., Ph.D.; 1924. Philadelphia and New York: Lea and Febiger. Demy 8vo., pp. 256, with illustrations. Price \$2.50.

² "Rats and How to Destroy Them," by Mark Hovell, F.R.C.S., with introduction by S. L. Bensusan; 1924. London: John Bale, Sons and Danielsson, Limited. Demy 8vo., pp. xiii. + 465, with 51 illustrations. Price: 10s. 6d. net.

¹ "The Errors of Accommodation and Refraction of the Eye and their Treatment: A Handbook for Students," by Ernest Clarke, M.D., F.R.C.S.; Fifth Edition; 1924. London: Baillière, Tindall and Cox. Crown 4to., pp. iv. + 251, with illustrations. Price: 8s. 6d. net.

The Medical Journal of Australia

SATURDAY, APRIL 11, 1925.

The Printing House.

ON the cover of this issue there appears a picture of the new premises of the Australasian Medical Publishing Company, Limited, "The Printing House." The space has been placed at our disposal in the most generous manner by the Manager of Allen and Hanburys (Australasia), Limited, and we wish to express our thanks to him in this place for this act of kindness. The other illustrations printed on other pages of this issue will enable the reader to form a good idea of the external and internal appearance of the house. As a printery it commands the attention and admiration of the trade. It has been planned with due regard to the requirements of the printer and to the demands of modern industrial hygiene. The importance of the opening of this new house, however, is not so much because it is a well planned printery or a hygienic factory. The Printing House is providing facilities for the accurate printing of medical and other scientific matter in Australia and its possibilities are almost limitless. In another part of this issue the development of the Australasian Medical Publishing Company, Limited, has been sketched from its small beginnings in 1913. That this journal, the first and for a time the only undertaking of the company, has been able to weather the stormy years of the war indicates the solidness of the foundation on which it is based. There need be no misgivings concerning the continued prosperity of the journal. The erection of The Printing House and the establishment of the printing department of the company, may be regarded as an experiment. It is, of course, impossible to forecast with certainty the result of any true experiment, but at times the outcome of carefully planned experimental conditions may be anticipated with some degree of confidence. Unless some wholly unforeseen disturbing event upsets all calculations, the result of this experiment must be an improvement

in the quality and quantity of scientific publications in the Commonwealth. The control of scientific printing in future will be in the hands of a company composed of medical practitioners of eminence whose position as members and directors of the company is the result of the confidence imposed in them by their colleagues. The Directors are responsible to the medical profession and to the whole body of scientists in the Commonwealth for the proper conduct of the work and they have taken this responsibility very seriously in their consideration of the planning of the new department. Every member of the printing staff has a considerable reputation as a highly skilled and competent craftsman and every man and woman on that staff is eager to justify his or her appointment.

The Printing House is built of reinforced concrete and is a solid structure capable of resisting the elements for many generations. The new printing department of the Australasian Medical Publishing Company, Limited, has been established on a solid foundation and it is hoped that it will grow and retain the support of the scientists of Australia. The propagation of knowledge depends on the printed word. The value of the teaching depends to a large extent on the manner of presentation. Correct printing demands modern machinery, the selection of artistic type faces, a high degree of skill on the part of those engaged in the type setting and printing, the use of suitable paper and ink of good quality and a thorough knowledge of correct typography. Educational and scientific work cannot be satisfactorily produced unless those responsible for the matter to be printed and those responsible for its passage through the press are in harmony and understand how to make the best use of every opportunity.

The conditions under which the new undertaking has been launched appear to be favourable; the reward of the courage of the Directors in taking this step and of the hard work, careful preparation and attention to detail seems to depend as much on the support that the scientific world will give to the undertaking as on the good will of the practical workers. The Linnean Society of New South Wales has given the printing department an opportunity

of demonstrating what it can do. A start has already been made with this work and it is evident that it is well within the powers of the staff to handle it skilfully. Members of the medical profession are earnestly requested to identify themselves with this act of progression and to utilize every opportunity of bringing the claims of The Printing House to the notice of scientific organizations and educational bodies.

Current Comment.

DEHYDRATION IN NUTRITIONAL DISORDERS OF INFANCY.

IN acute gastro-intestinal disorders of infants diarrhoea of a frequent and severe nature is often present. Dehydration of the tissues of the infant ensues and may reach a point at which typical symptoms make their appearance. A rise in temperature occurs and the child becomes wasted and loses much weight. The skin becomes dry and the colour is bad; cyanosis may be present. The pulse is rapid and thready and the extremities are cold and clammy; the fontanelle may be depressed. The child is restless and irritable and convulsions may be the terminal symptoms. These symptoms may not all be present, wide variations are seen and the signs pointing to the presence in the circulation of some poisonous substance may not be prominent. The question has been investigated from many points of view. Mellanby in 1916 published some important work on the subject. He referred to the isolation by Barger and Dale from ergot of an active substance known as β -imidazolyl-ethylamine. This substance was found to be derived from histidine by the removal of carbon dioxide. Mellanby placed β -imidazolyl-ethylamine in the same category as the ptomaines cadaverin and putrescin. He pointed out that conditions for its formation from histidine existed in the intestine and drew attention to its extraordinary power of stimulating unstriated muscle. He held that various hypotheses might be formulated involving β -imidazolyl-ethylamine. In the first place in diarrhoea and vomiting there might be an excessive production of β -imidazolyl-ethylamine in the intestine and this extra formation might be due to one of three causes. Either there was a changed or increased intestinal flora; there might be an altered chemical or physical condition which prevented the absorption of histidine of the food and allowed a subsequent increased production of β -imidazolyl-ethylamine or else there was a changed condition which allowed bacteria acting on histidine to produce a relatively large amount of β -imidazolyl-ethylamine rather than innocuous products. In the second place he thought that in diarrhoea and vomiting there might or might not be an increase of β -imidazolyl-ethylamine, but

that the β -imidazolyl-ethylamine present in the alimentary canal and mucous membrane became active in some way and was absorbed into the blood stream at a time when the animal was incapable of resisting its toxic action and rendering it innocuous. Mellanby carried out a series of experiments with this substance. Some of his results are important in the consideration of the question of the dehydration of body tissues in infantile gastro-intestinal disturbances. He found that there is a definite delay in the absorption of poisonous substances normally present in the intestine when animals are injected with large quantities of fluid. The presence of water in the intestine delayed the absorption of these substances. He found that the resistance of an animal against poisonous substances was greatly increased by the injection of fluid into the circulation and that an animal with a diminished amount of fluid had little power of resistance against them. He concluded that a child suffering from diarrhoea and loss of fluid, with an empty intestine and in a starving condition, was in an ideal position for the absorption of poisonous substances normally present in the alimentary canal and its mucous membrane.

Dr. A. Graeme Mitchell and Dr. Leon Jonas have recently endeavoured to correlate the clinical and laboratory findings in the dehydration associated with nutritional disorders of infancy.¹ They point out that grave symptoms occur more readily if dehydration takes place in an infant whose previous nutrition has been poor and that infants overfed with carbo-hydrates for long periods are especially liable to be the subject of dehydration when diarrhoea supervenes. They refer to the bio-chemical observations of many investigators. Balcar, Sansum and Woodyatt suggested that water existed in the body in two forms. In one form it was free and uncombined and in the other it was combined with colloids. Drs. Mitchell and Jonas state that if this is true, it may well be that the water in the hydræmic tissues of these flabby infants is in a large part uncombined. Signs of acidosis were found by Howland and Marriott, Chapin and Pease and by Schloss and Stetson. Schloss found an increase in intestinal intoxication in the non-protein nitrogen and urea of the blood. He held that this increase was due to defective kidney elimination and that probably lack of water restricted the formation of urine. Schloss also pointed out that the symptoms of intestinal intoxication are essentially those of uræmia; he held that acidosis plays a part in the symptomatology, but that the essential cause is probably some unknown toxic agency. Schwartz and Kohn determined the carbon dioxide content of the blood. They found considerable variation. In some instances the carbon dioxide content together with the non-protein nitrogenous constituents were normal. In some the carbon dioxide content only was diminished. In others the carbon dioxide content was normal, but retention of non-protein nitrogen was found. Finally in some in-

¹The American Journal of the Medical Sciences, February, 1925.

stances both a diminished carbon dioxide content and a retention of non-protein nitrogen were noted. Drs. Mitchell and Jonas point out that in non-nephritic conditions other than the intestinal intoxications of infancy in which there is a retention of non-protein nitrogen in the blood, there is also a low water reserve.

The patients whose condition was studied by these two observers, numbered thirty-five. In all of these clinical evidence of dehydration was present. In some definite toxic symptoms were present, in others these symptoms were milder in degree and in a third group no evidence of a toxic state was found. An interesting variation in bio-chemical findings was recorded in these three groups of patients. If no grave symptoms were observed, the non-protein nitrogen of the blood was practically normal. If the symptoms were of moderate severity there was a moderate increase only of the non-protein nitrogen, but if the patient manifested grave toxic symptoms the blood urea nitrogen and uric acid were as a rule definitely increased. The increase, however, was neither consistent enough nor great enough in the opinion of the observers to indicate that uræmia was a primary cause of the fatal termination. The carbon dioxide capacity of the blood plasma was found to vary according to the clinical evidence of hyperpnoea. When hyperpnoea was present the carbon dioxide content was decreased. The hydrogen ion concentration of the blood plasma was normal in five infants who were the subject of dehydration and who did not manifest a decrease in the carbon dioxide capacity of the blood plasma. In one infant with grave symptoms and with evidence of hyperpnoea the hydrogen ion concentration was within normal limits. Drs. Mitchell and Jonas state that the results of the study of the hydrogen ion concentration and of the carbon dioxide content of the plasma would indicate that the acid base balance was usually greatly diminished before death. In several infants, however, this did not occur and moreover, recovery followed in the case of several whose acid base balance was low. From this it is concluded that the acidosis is an accompanying phenomenon and not a primary cause of either the conditions or its fatal termination. Histological examination of the kidneys of ten infants who came to autopsy, revealed no abnormality. From this it was concluded that the retention of blood urea nitrogen and uric acid was not due to nephritis, but to dehydration *per se*.

The work of Drs. Mitchell and Jonas is of interest for several reasons. In the first place it throws light on a condition of comparatively frequent occurrence and it demonstrates how bio-chemical investigations are of assistance in the elucidation of the problems of disease. In the second place, when considered in conjunction with Mellanby's investigations it demonstrates the possible pathogenesis of the condition. Mellanby's findings in regards to β -imidazolyl-ethylamine will probably hold true of other poison products, whether they are of bacterial origin or not.

PRECIPITIN REACTION IN EPIDEMIC POLIO-MYELITIS.

The precipitin reaction depends on the application of a biological law that if an animal is treated with a foreign protein, specific precipitins are produced in the serum of the animal. The recognition of this law was the outcome of work by Krause who found that when he mixed the clear filtrates of cultures of certain microorganisms with their respective antisera the mixtures became turbid and finally a light precipitate made its appearance.

Dr. Edward C. Rosenow has recently sought to apply a specific precipitin reaction to epidemic poliomyelitis.¹ He refers to some work done by him in 1916 in which he demonstrated the presence of a streptococcus having peculiar neurotropic properties in a series of cases of poliomyelitis. He states that this streptococcus has been demonstrated consistently in sporadic cases of the disease and in a large number of epidemics. By means of agglutination tests and intra-cerebral inoculations of rabbits with dilute suspensions of swabbings from the naso-pharynx he demonstrated its presence not only in persons suffering from severe and abortive attacks, but also in normal persons and in persons not exposed to the disease. On account of the difficulty of isolation and identification of the streptococcus he sought to obtain a simple test in the form of a precipitin reaction by layering the clear extract of naso-pharyngeal washings or swabbings over anti-streptococcal horse serum used in the treatment of poliomyelitis. The results of this test were interesting. The tests were made in large numbers of persons suffering from epidemic form of the disease, in persons in contact with this form and in controls consisting of persons suffering from other diseases and in apparently normal persons both inside and outside epidemic areas. A reaction was obtained in the early stages of every undoubted case of poliomyelitis and in what were considered as abortive attacks. In seventeen undoubted instances of the disease no reaction was obtained, but in every case the patient had manifested symptoms of the disease for four or five days. A reaction was also obtained in 77.5% of apparently normal contacts, in 24% of persons ill with scarlet fever and in 59% of normal persons within the epidemic zone. In control groups outside the epidemic zone the figures in the last two groups were 9.5% and 5.5%.

In considering these results it must be remembered that the causative organism of poliomyelitis has not yet been determined. Dr. Rosenow claims that his findings corroborate his former conclusions that the type of streptococcus described by him is commonly present in the naso-pharynx of persons affected by the disease and in a large number of normal persons. He claims that the presence of a reaction is not without significance, but that it still has to be decided whether the presence of a reaction indicates the presence of a true virus in addition to that of the streptococcus.

¹ The Journal of the American Medical Association, February 7, 1925.

Abstracts from Current Medical Literature.

DERMATOLOGY.

Sarcoid.

E. R. WHITMORE (*Archives of Dermatology and Syphilology*, January, 1925) describes a Type III. sarcoid associated with infection of the tonsils and gums. Clinically the condition was *erythema nodosum*. Tender, painful nodules appeared in crops and were associated with infection of the tonsils and gums. These generally disappeared on correction of the infective foci. In the instance reported by the author, the condition was chronic and lasted four years. The lesions were more numerous in the arms than in either *erythema nodosum* or *erythema induratum* and the individual lesions were smaller and harder. Microscopically the nodules manifested peri-vasculitis and endo-vasculitis of Derrier's Type III. sarcoid. There was some cellular infiltration, but there were no giant cells, no areas of necrosis and no evidence of tuberculosis or syphilis.

Trichostasis Spinulosa.

J. H. MITCHELL (*Archives of Dermatology and Syphilology*, January, 1925) states that the lesion in *trichostasis spinulosa* appears to be ordinary follicular keratosis of the congenital type. On closer examination the involved follicles were found by the author to be distended, funnel-shaped, horny plugs which were readily removed by tweezers, leaving gaping orifices. Examination of plugs disclosed a lamellated, horny, funnel-shaped mass in the centre of which was a sheaf-like bundle of thirty or forty fine non-pigmented and non-medullated lanugo hairs, pointed at tip and bulbous at the root.

Mycotic Paronychia.

L. B. KINGERY AND C. H. THIENES (*Archives of Dermatology and Syphilology*, February, 1925) report a hitherto undescribed condition apparently peculiar to fruit canners. The condition commonly known as fruit poisoning has existed for the past few years in certain canneries, the incidence amongst the workers being nearly 33%. Continual emphasis is placed on the almost explosive, epidemic-like outburst occurring at the time pears pass through the factories. The condition is characterized by a paronychia, pain and the actual loss of one or more nails. In addition laceration, vesiculation and fissuring between and on the interdigital aspects of the fingers are frequently found, occasionally with patches of erythematous-vesicular dermatitis on hands and forearms. Cultures from several patients have uniformly revealed fine cultures of a yeast-like organism. Animal and human inoculations with the organ-

ism thus obtained result in a clinical picture practically identical with known mycotic infections of the skin and exactly corresponding to the symptoms of patients suffering from the disease.

Painful Nodular Growth of the Ear.

O. H. FOERSTER (*Archives of Dermatology and Syphilology*, February, 1925) gives a summary of cases of painful nodular growths of the ear reported by various authors. The condition occurs in males between twenty-seven and sixty-five years of age. A striking feature is the uniformity with which the lesion is situated in the upper pole of the ear in the region of the crown angle and its location on the free border of the helix. The latest time after its appearance at which an unhealed lesion has been seen, is eight weeks. The nodule was then adherent to the cartilage. The growths are single, ovoid or vascular, well defined and firm, either embedded in skin or elevated several millimetres above the surface. Pain is a characteristic feature in nearly all of the cases. Some patients form the habit of sleeping with the cupped palm held over the ear. Histologically in all instances there was found a chronic inflammatory process of the corium involving the cartilage and a circumscribed hypertrophy of the epidermis resulting in the formation of a scale-cupped nodule. The epidermal characteristic was a circumscribed and well-developed acanthosis. The findings were sufficiently uniform to allow the grouping of these cases under one heading and their differentiation from *verruca keratosis*, epithelioma, clavus and other similar conditions. Treatment consists in excision inclusive of the cartilage. Radium and X-rays have not been found to be satisfactory in a large percentage of cases.

Congenital Ectodermal Defect.

GEORGE MCKEE AND GEORGE ANDREWS (*Archives of Dermatology and Syphilology*, December, 1924) state the term ectodermal defect, as used in the literature, has been employed to signify the incomplete development of the epidermis or its appendages or its absence in circumscribed areas and under this term kerato-dermia and naevi are disregarded. There is a record of eight patients who presented a fairly universal congenital ectodermal aplasia. They all exhibited the same clinical characteristics and they comprised a distinct group of congenital ectodermal defect. The principal clinical characteristics are congenital absence of sweat glands; absence of pilo-sebaceous apparatus over most of the body; definite dental aplasia; depressed nasal bridge; atrophic rhinitis; prominent supra-orbital ridges; thick, protrusive lips; thin, glossy, smooth, dry skin; papular lesions on the face and heat intolerance. The detailed description of a new patient is presented by the authors. In addition to

possessing all the clinical characteristics of the group this patient exhibited a Mongolian facies, deformed ears, fine wrinkles of the eyelids and environs, radiating linear defects at the oral commissures and near the nostril. The affection is familial and all but one patient have been males. Most of the patients and their ancestors appeared to have been free from syphilis and tuberculosis. Arrest of development occurred early in intra-uterine life, but the cause of the developmental defects is unknown.

Experimental Acne Varioliformis.

M. M. STRUMIA (*Archives of Dermatology and Syphilology*, December, 1924) states that although numerous papers have been written from the standpoint of the lesions of *acne varioliformis* and similar lesions, little has been done, except to speculate, towards the solution of the problem of aetiology. In the tests made by Strumia two instances of *acne varioliformis* which were distinctive by reason of deeply necrotic and hæmorrhagic centres and surrounding woody oedema, yielded both staphylococci and streptococci on culture. Lesions identical in morphology with those of *acne varioliformis* were reproduced in the patient by the intradermal injection of these two organisms. The author states that the experiments indicated that the organisms are not of a strain specific for this disease and that a tuberculous factor can be definitely excluded.

RADIOLOGY.

Gall Bladder Diagnosis.

R. D. CARMAN AND V. S. COUNSELLER describe the technique of the X-ray diagnosis of cholecystic disease with the aid of the sodium salt of tetrabromophenolphthalein (*American Journal of Roentgenology*, November, 1924). The procedure should not be attempted in patients with obstructed ducts, but where no such obstruction exists gratifying results have been obtained. Vasomotor shock may occur within five to ten minutes; uneasiness occurs followed by pain over the dorso-lumbar spine, flushing of the skin and an initial rise of ten millimetres to fifty millimetres in blood pressure with a sharp drop in blood pressure within a few minutes. This reaction is at times very severe, and the authors conclude that the method is unsuitable for patients with cardio-vascular disease. Adrenalin chloride is given to prevent the sudden fall of blood pressure. Patients are always admitted to hospital and no food is allowed on the day of examination. Four and a half grammes of the salt are added to forty cubic centimetres of distilled water and heated slowly until solution occurs; the mixture is then sterilized in a boiling water bath for fifteen minutes. The injection is made intravenously in two sections at an half hour interval, care being taken

not to allow any solution outside the vein. Injection should be made very slowly. Skiagrams of the gall bladder region are taken at five, eight and twenty-four hours or oftener if desired. The gall bladder usually retains sufficient dye to cast a shadow at four or five hours, while the shadow is most dense at from eight to twenty-four hours. Unvarying size of the bladder points to loss of elasticity, while mottling indicates gall stones or papilloma.

Pyogenic Joint Infections.

D. B. PHEMISTER (*American Journal of Roentgenology*, July, 1924) discusses the changes occurring in the articular surfaces in tuberculous and in pyogenic infections of the joint. By X-ray examination it is possible to detect proliferative, absorptive and atrophic changes at any stage in the course of the disease. In pyogenic infection the destruction extends from the points of contact to the free surface while in tuberculous lesions the reverse is noticed. In both conditions the articular cartilage is involved secondarily, the infection being primary in either the bones or the synovial lining. Disorganized cartilage is quickly broken up and removed mainly through the action of proteolytic ferments. If the lesion is a primary arthritis, it is rare to see bony necrosis and sequestration. When the infection is primary in the bone it will spread into the epiphysis and joint; necrosis and sequestration of the bones bordering on the articular surface are not uncommon. When cartilage is destroyed it manifests little tendency to regenerate, but eventually the granulation tissue is changed into a fibro-cartilage and in such cases there is a tendency to fibrous ankylosis. As previously stated, the tuberculous lesions start in the synovial membrane or in the bone and the cartilage is only involved secondarily. The process is a slow one and is rarely sufficient to kill articular cartilage and the latter is usually destroyed by direct spread from the tuberculous granulations. There is an absence of proteolytic ferment in tuberculosis and exfoliated cartilage is liable to persist for some time as a loose body in the joint. The author gives illustrations of the appearances of infected joints at various stages of the disease and points out that a thinning of the bones is an early sign in tuberculosis and a late one in pyogenic infections.

Climacteric Symptoms.

J. BORA, of Vienna, discusses the treatment of climacteric symptoms by irradiation of the pituitary and thyroid glands (*British Journal of Radiology*, B.I.R. Section, August, 1924). The author refers to the troublesome vaso-motor disturbances with flushings and sweatings and vertigo, laboured breathing or syncope. These symptoms may occur at any time, even during sleep and the patient may be completely prostrated. These conditions are generally looked upon as due to disturbances of ovarian

function, but treatment of the ovary does not control them, while radiation of the hypophysis and thyroid gives relief to the symptoms. The author has treated fifty patients in this manner. He irradiated the hypophysis in thirty-seven persons and the thyroid in thirteen. It is thought that X-rays have a selective action on the *pars intermedia* and this opinion is confirmed by experiments of Werner and others. The author is thus led to the conclusion that these climacteric symptoms are due to hyperactivity of the *hypophysis cerebri* and of the thyroid. Dosage is measured so that about one-tenth of an erythema dose reaches the hypophysis at weekly intervals for three doses.

Massive Lung Collapse.

G. W. HOLMES (*American Journal of Roentgenology*, June, 1924) gives a further report on massive collapse of the lung. The condition is unusual and the collapse occurs without any gross lesion such as bronchial obstruction or pleural effusion. It usually involves one lobe and not infrequently the whole of one lung. Any injury which causes paralysis or fixation of the diaphragm, either directly or indirectly, may be accompanied by collapse. The condition may develop within a few hours or as late as one week after the exciting trauma. Onset is sudden and the temperature may rise, probably owing to pneumonia. Respiration and pulse rates rise and the affected side is immobilized. The heart is displaced to the affected side and the diaphragm is elevated on this side and is fixed.

The Colon.

R. W. MILLS AND H. W. SOPER discuss various colonic changes (*American Journal of Roentgenology*, June, 1924). The authors lay stress on the great importance of the personal equation in this type of work and the great value of clinical experience. The colon varies widely in topography, form, length, tonus, contractural reactions and mobility in different individuals. The enema is of far greater value in the diagnosis of colonic conditions than the opaque meal. The authors also publish a series of skiagrams to illustrate the various normal and abnormal conditions likely to be encountered. Restoration of function may generally be secured by dietetic and hygienic methods. Inflammatory conditions must receive appropriate attention.

Intensifying Screen Contact.

R. B. WILSEY (*British Journal of Radiology*, Roentgen Section, July, 1924) discusses the necessity of good contact between intensifying screens and films. Firm contact is essential for good radiographic definition; nearly the whole photographic effect, when working with screens, is due to the fluorescent light from the screens and film is sure to give a blurred image. Cassettes with thick felt pads all give good contact over the films, regardless of whether the

cover is rigid or slightly flexible. An air cushion should give completely uniform pressure over the whole cassette regardless of irregularities in either the front face or cover.

Life of Coolidge Tube.

O. A. MARKER (*British Journal of Radiology*, March, 1924) describes a method of protecting the Coolidge tube from accidental injury due to the proximity of metal parts to the stand. The author places a sheet of mica 12.5 centimetres square on the inner side of the tube box and the tube can then be approximated to the metal base plate of the stand. The thickness of mica used corresponds to a filter of one millimetre of aluminium.

Radiography of the Spinal Cord.

H. PEIPER AND H. KLOSE (*Klinische Wochenschrift*, December 2, 1924) give their experiences with the injection of "Iodipin" in the radiological diagnosis of tumours of the spinal cord. Two cubic centimetres of a 20-40% solution of "Iodipin" were injected into the sub-occipital region in the majority of instances. If the lesion were known to be in the *cauda equina*, the space between the twelfth dorsal and first lumbar vertebrae was chosen. The patient sat up and care was taken to exclude air bubbles. Though no anaesthetic was required morphine was usually given. After the injection the patient was instructed to cough or else the spinal column was firmly percussed to prevent any coagulation of the oil. Radiograms were taken in five minutes with the patient raised thirty degrees. Both sides were exposed to each plate and two areas were photographed—the cervical and upper dorsal region and the lower dorsal region to the sacrum. The authors state that the patient is then kept in bed for two days in this position or else is allowed to sit up and further pictures are obtained. The iodine solution either falls rapidly to the lower end of the dural sac or else is arrested wholly or partially at one point. In normal cases the solution has completely reached the bottom of the sac within three days. Adhesions as well as tumours will cause a partial or total arrest of the solution and the differential diagnosis between them is not yet very clear. The diagnosis, like that of gastric carcinoma, depends largely on the detection of filling defects. From their experience they consider that a positive result means tumour, compression or adhesions. The differential diagnosis between these depends on the physical and neurological findings. Failure to obtain a result means that compression can be definitely excluded. With the first solutions used there were frequently slight headache and pains in the spinal column. One patient had incontinence of rectum and bladder for two days. The temperature was raised in all cases to 39° C., but the pulse rate was unaltered. All these symptoms subsided within four days. Since purer solutions have been employed no ill effects have been noted.

Medical Societies.

SYDNEY HOSPITAL CLINICAL SOCIETY.

A MEETING OF THE SYDNEY HOSPITAL CLINICAL SOCIETY was held in the Lecture Hall, Sydney Hospital, on December 4, 1924, Dr. T. FIASCHI, D.S.O., the President, in the chair.

Ankylosis of Left Temporo-Mandibular Joint.

DR. GEORGE BELL, O.B.E., showed a female patient, aged eleven years, a Syrian, who had been admitted to Sydney Hospital on November 10, 1924. Six years prior to admission the patient had fallen and injured her jaw. The accident had occurred in Syria. After this accident the jaw had become "completely ankylosed" and she had had some treatment which had resulted in a slight improvement. No other history of illness could be obtained. On admission to hospital the patient had been able to move the jaw voluntarily about 0.6 centimetre (a quarter of an inch). When opened as far as possible the teeth had been separated only 1.8 centimetre (three-quarters of an inch) and it had not been possible to open the jaw forcibly any further. The patient had been unable to approximate the teeth. She was otherwise healthy. On examination it had been found that a mass of bone was present in the region of the left temporo-mandibular joint rendering this portion of the face much more prominent than the corresponding region on the right side. Dr. Edwards had submitted the patient to radiological examination and had reported that ankylosis of the left temporo-mandibular joint was present with excessive new bone formation.

On November 19, 1924, Dr. Bell had exposed the affected area by a vertical incision. Very slight movement had been present at the joint. Excessive bone formation had been present on that portion of the zygoma which entered into the formation of the joint, and also on the condyle and upper part of the neck of the mandible. He had made an attempt to depress the mandible further by means of a gag inserted into the mouth, but he had found it impossible to increase the range of movement until the mass of bone including the larger portion of the neck of the mandible, had been removed. This procedure had resulted in considerable increase in the range of movement and the patient at the time of demonstration was able to separate her teeth voluntarily as freely as a normal person.

In the discussion which followed, Dr. Bell was congratulated on the good result. Surprise was expressed at such a good function being obtained by this simple procedure and allusion was made to the fact that section of the mandible and the formation of a false joint by an arthroplasty was the usual procedure in such cases, but recovery was usually much slower and not so satisfactory when that method was adopted.

Myeloma of Radius.

Dr. Bell also showed a male patient, aged thirteen years, who had been admitted to Sydney Hospital on October 27, 1924. One month prior to admission the patient had noticed a swelling in the region of the left wrist. He had thought that at the time of admission it was smaller than when first noticed. No history of injury had been obtained. On examination the distal end of the left radius had been found larger than the right. The bone had been hard on palpation and no egg shell crackling had been elicited. Dr. W. A. Edwards had taken a skiagram of the radius on October 20, 1924, and had reported the presence of a large bone cyst of the lower end of that bone. No reaction had been obtained to the Wassermann test or to the precipitin and complement deviation tests for hydatid disease. Dr. Gertrude Grogan had examined the blood on October 28, 1924, and the following results had been obtained: Erythrocytes, 5,250,000 per cubic millimetre; hæmoglobin value, 75%; colour index, 0.71; leucocytes, 6,000 per cubic millimetre and of these 51.75% had been neutrophile cells, 1% eosinophile cells, 0.75% basophile cells, 41% lymphocytes and 5.50% large mono-nuclear transitional cells.

The absence of bony trabeculae in the cyst as shown in the skiagram and the absence of the typical egg shell crackling, had seemed in favour of a diagnosis of cystic disease as against that of myeloma.

On November 5, 1924, Dr. Bell had exposed the anterior surface of the lower end of the radius immediately anterior to the tendons of the *supinator longus* muscles. The bone here had been very thin and was easily removed with forceps. The contents of the cavity in the bone had been scraped with a sharp spoon. The cavity had been swabbed with tincture of iodine and the incision closed. The wound had healed by first intention. A skiagram taken on November 27, 1924, had revealed no regeneration of bone. The patient had been discharged from hospital on November 28, 1924, with orders to report for observation in three months.

Dr. Keith Inglis had examined the tissue removed and had reported as follows: "The lesion is a neoplasm and the microscopical character of portions of the growth are such that it should be regarded as a myeloid sarcoma."

The skiagram was shown and a demonstration of section of the growth was made by Dr. KEITH INGLIS. This was done with a view to obtaining the advice of those present as to future treatment.

It was pointed out that myeloma or myeloid sarcoma was commonly regarded as a malignant tumour liable to give rise to metastases, but this view was not held by many of those present. Attention was also drawn to the fact that many English pathologists did not regard the tumour as malignant. Dr. Inglis thought that further operation was not indicated and he pointed out that a similar condition had been recently seen and examined by X-rays at Sydney Hospital. In that instance progress had been slow and the history of eight years' duration. The microscopical character in both instances was somewhat similar, the growth was very cellular and much fibrous tissue was present. In the case reported by Dr. Bell, however, enormous cysts were present, while in that of longer duration this was not so.

Plexiform Neuroma.

Dr. Bell also showed a man of middle age, a farmer, who complained of a large swelling in the left arm. The swelling had been present since birth and had caused him no inconvenience until he fractured his leg some months previously. Since then he had used crutches and the left arm had become very weak. On examination the left arm was seen to be about three times as large as the right. It was soft, flabby and fat. Near the wrist over the radius cord-like thickenings could be felt beneath the skin. Dr. Bell said that he thought the condition was plexiform neuroma, with excessive fat formation in the fibrous stroma. Dr. Inglis concurred in this opinion. He thought that the palsy of the arm might be due to the use of crutches.

Comminuted Fracture of the Humerus.

Dr. Bell also showed a male patient, twenty-four years of age, a greengrocer, who had been admitted to Sydney Hospital on September 20, 1924. Among other injuries the patient had sustained a fracture of the right humerus in a motor car accident. The arm had been fixed against the patient's body with bandages, but a skiagram taken on September 21, 1924, had revealed the presence of a fracture at the junction of the lower and middle thirds of the humerus with wide displacement of the fragments. Various splints including Jones's splint for the humerus had been applied, but no improvement in the position of the bone had been obtained and Dr. J. G. Edwards had expressed the opinion that probably some muscle was situated between the fragments. Dr. Corlette had seen the patient in consultation and had advised the making of an incision and readjusting the bones as found necessary. Considerable bruising of the tissues and swelling of the arm in the region of the elbow had been present and on this account operation had been postponed. From September 27, 1924, to October 1, 1924, the patient had suffered from follicular tonsillitis. An operation had been deferred until October 8, 1924.

An incision had been made through the triceps muscle and the fragments of bone had been found widely separated through intervening muscular tissue. The fragment had been manipulated into as good a position as was possible and as considerable comminution was present no internal fixative apparatus was used. The incision had been closed and the limb put on an internal angular splint which was supported on a pillow, the patient being confined to bed. The day following the operation evidence of paralysis of the muscles of the forearm supplied by the radial nerve had been present. Dr. Bell thought that this had probably been caused by incision or contusion of the nerve during the manipulation of the bones into position. A skiagram taken on October 16, 1924, had revealed that the bones were in good position. Union had taken place more rapidly than usual and at the end of two and a half weeks the patient had been able to hold his arm away from his side and abduct it to almost a right angle. The paralysis of the extensor muscles of the forearm had been treated by the application of a cock-up splint and by November 3, 1924, extension of the wrist had been voluntarily performed. From this date the rate of recovery of the affected muscles had been rapid. The wound had healed by November 14, 1924. Dr. Bell pointed out that union of the fragments had been rapid and asked whether comminution of the bones would be a good method of treating non-union of fracture of the humerus.

Pyloric Stenosis.

In conjunction with Dr. GEORGE WILLCOCKS, O.B.E., M.C., Dr. Bell also showed a male patient, aged forty-five years, a clerk, who had been admitted to Sydney Hospital on November 25, 1924. The patient had complained of indigestion and vomiting. Inquiry into his previous health revealed that he had suffered from indigestion for one year; he frequently belched wind and until he did this acute pain had been present in the abdomen. About six weeks prior to admission the patient had begun to vomit; at first he had vomited undigested food and later a sour liquid. He had not vomited since admission. The pain had been referred to the epigastrium. Its onset had usually been between meals and "nearer the next meal." Sometimes the pain had awakened the patient between two and three o'clock in the morning and before the onset of vomiting. It had been so severe as to cause him to walk about in order to obtain relief. Food had relieved the pain for a few hours. He had lost 9.4 kilograms (one and a half stone) in weight. When first seen by Dr. Willcocks peristalsis of the stomach had been visible. Dr. Edwards had examined the patient with X-rays and had reported that the stomach was greatly dilated and that there was a large residue at six and at twenty-four hours after ingestion of food. He had concluded that an advanced degree of pyloric stenosis was present. Further examination of the patient had revealed the presence of an aortic diastolic murmur and leucoplakia of the tongue. Response to the Wassermann test had been obtained on November 28, 1924. Knee jerks had been present and the pupils had reacted to both light and accommodation. Dr. Bell said that a diagnosis of pyloric stenosis and tertiary syphilis had been made.

In discussing the case Dr. EDWARDS said that the X-ray picture suggested simple ulceration rather than carcinoma or syphilis of the stomach. Other speakers referred to the probability of one diagnosis covering the whole condition and considered that the stomach was the site of a syphilitic lesion. The consensus of opinion was that small doses of an arsenical preparation should be given intravenously and that iodide of potassium and mercury should be administered. Re-examination by X-rays in one or two months was recommended. It was thought that if carcinoma of the stomach was present the condition was inoperable from a curative point of view and for this reason the delay would not lessen the patient's chances.

Extensive Ulceration of the Legs.

Dr. H. C. ADAMS showed a middle aged man who had previously been in the navy and who had latterly travelled in many parts of the world. He had complained of great swelling of the legs and incisions had been made in the region of the ankles some months previously to allow the fluid to be evacuated. The wounds had broken down and

had got worse. When seen by Dr. Adams the feet and legs to a distance of about fifteen centimetres (six inches) below the knee had been covered with soft granulation tissue and had been about twice as large as normal. No skin had been visible in these areas except on the soles of the feet. A purulent exudate had been present on the surface. The patient had had a very large heart and the swelling of the legs had been due to heart failure. Complete response to the Wassermann test had been obtained. The condition had improved considerably by treatment with "Eusol" and *lotio nigra* used externally and iodides and mercury given internally for two months. Dr. Adams said that the condition might be due merely to local infection and poor blood supply caused by the extensive oedema and thought it might be aggravated by the syphilitic infection.

Pre-Cancerous Epithelioma.

Dr. GEORGE R. HAMILTON showed a female patient, aged forty-one years, who complained of sores on the back and shoulders of ten years' duration. These had recently become more enormous and extensive. On examination it was seen that five or six circular reddish areas were present, one on the right scapula and the lower part of the back and also on the calf of the leg. These areas were not raised above the level of the skin and were covered with discrete scales. They varied in size from that of a threepenny piece to that of one shilling. They resembled rodent ulcer, but were redder in colour. Dr. Hamilton said that he thought the condition was that described by Boan as pre-cancerous epithelioma.

In discussion it was pointed out that this disease had not been described in Australia and many doubted its existence as a separate entity. Erythematoid basal cell epithelioma was suggested as the more likely diagnosis. Dr. Inglis thought that these two conditions were closely related from a pathological point of view.

Stricture of the Ureter.

Dr. R. BRIDGE showed a woman, aged fifty-six years, who complained of constant pain of seventeen years' duration in the right hypochondrium. The pain was associated at intervals with exacerbations and was accompanied by vomiting and prostration. Symptoms were suggestive of biliary colic. At an operation five years previously the right kidney had been fixed. A firm movable mass was palpable in the right lumbar region. Tenderness was present at this site and in the right hypochondrium. A pyelogram had been taken and the X-ray picture revealed an apparent narrowing of the ureter about 2.5 centimetres below the pelvis of the right kidney. The examination had been carried out without an anaesthetic and while the fluid was being injected the patient had complained of pain in the right hypochondrium which she said was identical with the pain she experienced during her attacks. In the pyelogram the calyces of the right kidney were not shown clearly and the reason for this was not evident. Dr. Bridge thought that the apparent narrowing of the lumen of the ureter might be a cause of obstruction to the outflow of urine at times with resultant tension and ureteral colic. This condition might be aggravated by the presence of a movable kidney. He thought that it was advisable to undertake an exploratory operation in order to determine the cause.

In the discussion it was suggested that an incision should be made through the right rectus muscle so that an affection of the gall bladder might be suitably treated. It was also suggested that there might be a considerable functional element in the patient's condition.

Obituary.

ALLAN PETER McLEOD.

THE relatives and friends of Dr. Allan Peter McLeod received a profound shock when the news of his death reached them by cable from the Orient Company on March 9, 1925.

Educated at The Scots College, Sydney, and resident at Saint Andrew's College he graduated in medicine at the University of Sydney in 1921. He was almost immediately appointed resident medical officer at the Mater Misericordiae Hospital, Brisbane, where he earned the love and esteem of all who came in contact with him. Later he became resident at the Hospital for Sick Children, Brisbane, and from there proceeded to England to undertake the study of ophthalmology.

He secured an appointment at the Royal Westminster Ophthalmic Hospital where he worked for eighteen months.

He cabled of his success in his examinations and was returning to Brisbane to practice his newly acquired specialty, having been appointed honorary assistant ophthalmological surgeon at the Mater Misericordiae Hospital.

At the age of twenty seven years, in the full bloom of youth, with every prospect of a successful career and with a warm welcome awaiting him from his many friends in Sydney and Brisbane he left for Australia on the *Oronsay* on February 7, 1925. He went ashore at Colombo, but feeling ill returned to the ship. He went to bed for the last time. Pneumonia was claiming another victim and two days out from Fremantle he breathed his last. His remains were buried at sea.

Deservedly popular, his loss is deeply felt by all who knew him. At his college he was a brilliant footballer and was always a fine physical specimen of a man. It would have been expected that he would deflect death's fierce thrust.

His memory will remain with those who knew him as that of an honest, straightforward boy with a very lovable nature struck down at the threshold of useful work.

Post-Graduate Work.

POST-GRADUATE COURSE IN OBSTETRICS.

THE MELBOURNE PERMANENT COMMITTEE FOR POST-GRADUATE WORK is arranging a winter course of lectures in obstetrics. The lectures will be delivered in June and July, on Tuesday evenings at 8.30 p.m., at the B.M.A. Building, East Melbourne. During the last fortnight of the period accommodation will be provided within the Women's Hospital for members of the post-graduate course who wish to be in residence in order to see the whole working of the hospital during that time. This arrangement has been made with the consent of the committee of the management of the hospital and by arrangement with the honorary staff. If the number attending the course is very large, admission to residence at the hospital will be by ballot. During this period no medical students will be working at the institution.

Those who do not wish to see the full work of the hospital, can by courtesy of the honorary staff be allowed to see all the usual day work, to attend the ante-natal clinics, to witness all ordinary and abnormal deliveries and to see patients suffering from eclampsia, sepsis and so forth.

The Melbourne Permanent Committee for Post-Graduate Work hopes that practitioners other than those resident in the suburbs will avail themselves of this opportunity. Further details in regard to fees and so forth will be announced at a later date.

Correspondence.

GLYCOSURIA AND DIABETES.

SIR: Observing your review of Professor McLean's book on glycosuria and diabetes and the comments on the titration and colorimetric methods of blood sugar estimation, it occurred to me that a simple method which did not necessitate the use of expensive and complicated

apparatus might be of some use to gentlemen in general practice. The following method is taught at the large diabetic clinic at the Edinburgh Royal Infirmary and is recommended for use in general practice. Chemicals required: Dry picric acid, saturated solution of sodium carbonate (22%), solution glucose (0.02%) in saturated picric acid.

Technique: Take two cubic centimetres of well mixed oxalated blood in a twenty cubic centimetre centrifuge tube and add eight cubic centimetres of water (four volumes). When the corpuscles have been laked add 0.5 gramme of picric acid (dry) and with a glass rod stir the resulting mixture at intervals until it assumes a slight yellow colour. By this means the protein is precipitated and when this is complete centrifuge the tube and filter the supernatant fluid through filter paper. Using a pipette, place three cubic centimetres of this filtrate into a graduated thirty cubic centimetre test tube and add one cubic centimetre of the saturated solution of sodium carbonate. To a similar tube add one cubic centimetre of saturated sodium carbonate and three cubic centimetres of 0.02% glucose-picric acid solution (the standard). Place both tubes in boiling water for fifteen to twenty minutes, remove and allow to cool. Add water to the standard tube to bring it up to the ten cubic centimetre mark. The other tube containing the blood filtrate (the unknown) is carefully diluted with water until the colour is the same as in the standard tube. It is advisable to invert this tube after each addition of water to insure good mixing. Then take the reading of the "unknown" tube.

Calculation: The equivalent of 0.6 cubic centimetre of blood is used and the standard contains 0.6 milligramme of glucose. Therefore, the ratio is the same if one hundred cubic centimetres of blood and 0.1 gramme of glucose are employed. This enables the percentage of blood sugar to be read direct from the tube containing the blood. For example a reading of 8.5 cubic centimetres is equivalent to 0.085% sugar; another of twenty cubic centimetres is equivalent to 0.20% sugar and so on.

In practice all suspected cases of diabetes should undergo a blood sugar test before treatment with "Insulin" is resorted to, thereby avoiding the danger of producing a hypoglycemia in the condition known as "renal glycosuria" (due to a low renal threshold) where the patient is otherwise quite normal and free from diabetes. Such cases, showing sugar in the urine after a moderate carbohydrate meal (some kidneys secreting sugar when the blood sugar concentration is as low as 0.13) have been mistaken for diabetic subjects and duly relegated to the ranks of that unfortunate band—the diabetic fasters.

It is here that the blood sugar estimation may be of value, for it is recognized that these cases (low renal threshold) conform like normal individuals to the rule that their blood sugar curve returns to the fasting level within one and a half to two hours after an average carbohydrate meal, whereas the descending curve is much more prolonged in the diabetic.

Yours, etc.,

H. GENGOLD SMITH, M.R.C.P. (Edin.).

Harley House,
Collins Street, Melbourne,
March 19, 1925.

RESEARCH IN AUSTRALIA.

SIR: The present position of medical research in Australia is very unsatisfactory. We have wasted so much time in doing important things badly, without plan or competent direction that I think it time we turned for a change to sound methods. It is the curse of democracy that superior scientific intellects are forced to seek a livelihood under the control of governments and so are at the mercy of men most times of inferior intellectual calibre. We are all governed eventually by departmental officials. Scientific research in Australia suffers from just that handicap. Workers in that field do not get anything

like an adequate return; besides being poorly paid, their technical and intellectual freedom is necessarily cramped by subjection to departmental officials. This evil has the result that Australia has not made contributions to pure scientific medicine anything like the extent it should when you think of the material and intellectual resources available.

There exists too the curious paradox that while surgeons, physicians and other specialists make very large incomes, the research worker, who makes this possible for them, languishes. The practitioner could not now successfully treat, say, any surgical disease, diphtheria, diabetes and many other ailments had not Pasteur, Lister, Behring, Koch, Banting and others like them, never lived. Without such men the practitioner, as Ovid neatly remarks: "*Medicas exercet inaniter artes.*" When I speak of research I do not refer to the gropings and compilations that pass for such. A lot of the endowed research in England now is useless waste of time because it lacks direction and is produced by men insufficiently trained.

Now I notice that the Federal Government is prepared to endow research—cancer research, I believe—to the extent of £5,000 for a start and it is further suggested that this expenditure should be controlled by the Federal Health Department. The success of the ideal plan would, I think, be seriously imperilled by such a course of action. I should think the only way to spend the money wisely is to hand it over to a Federal medical research council, a body statutorily set up with all the powers of and with just so much freedom, technical and financial, as a university senate. It should be responsible to nobody but Parliament. It should be, in effect, the Federal high court of medicine. The interests of health and medicine can be safeguarded only in that way as are our legal rights by the High Court of Justice. And I consider further it would be wrong to place on that council anybody but research workers with long and good research records. To put control of research expenditure under general practitioners or specialists or government departments would be the same as handing a money grant for university purposes to primary school teachers or to clerks in an education department. The analogy is complete. And these opinions are directed not specifically at the Federal Health Department, but generally against all departments in any country who presume to interfere in these matters.

In regard to cancer, it is agreed that the histologist has had his say, in so far as his efforts alone are capable of solving the problem; his science is sterile. The problem is now purely bio-chemical and should be handed over to pure scientists who alone are qualified to understand its difficulties and to devise solutions. That being so, they should have complete technical and financial freedom.

On such a council as I suggest I should like to see as President Dr. Penfold, one of the really distinguished medical scientists of our time and a man of high international repute; as members, Professor Brailsford Robertson, of Adelaide, Professor Cleland, of Adelaide, Professor Priestley, of Sydney, Drs. Eustace Ferguson, Tebbutt and Ingram, of Sydney, and Kellaway, of the Walter and Eliza Hall Institute of Melbourne and any other research workers of standing as may occur to the responsible authority. A minimum lay membership to do accounting *et cetera* could be included. Such a council could direct work in all fields of medical research and allot rewards—they alone or men of similar calibre would be competent.

My whole point is that the only sound economy is to have work done by people who know how.

Yours, etc.,

J. V. DUHIG.

Brisbane,
March 18, 1925.

FRACTURE OF THE SKULL.

SIR: I am acutely interested in Dr. Jefferis Turner's letter in your issue of March 14, as I have held similar, not identical, views for twenty years and have found few colleagues to apprehend them, still fewer to value them.

Even admitted that a depressed fracture of the vault may indirectly cause symptoms, a fracture of the base is usually linear, symptomless and harmless. When a fracture of the base is found *post mortem*, death was usually due not to it, but to a laceration of the brain at a distance, perhaps by *contre coup* and not related to the fracture except as caused by the same violence.

Yours etc.,

F. GUY GRIFFITHS.

Sydney, March 16, 1925.

X-RAY THERAPY.

SIR: Re Dr. Flecker's remarks in your journal, dated February 28, 1925, where he stated that I "neglected to inspect or examine specially selected patients for demonstration purposes during the Congress held in Melbourne in November, 1923."

I hope his statements in advocacy of deep therapy are more accurate than his knowledge of my movements at the Congress.

Dr. Flecker infers that I was not present at the demonstrations of X-ray therapy. As President of the section and a visitor to Melbourne, it would have been very remiss on my part not to have attended demonstrations which Dr. Clendinnen and the staff of the Melbourne Hospital had gone to so much trouble to arrange.

I attended two of these demonstrations at the Melbourne Hospital during the Congress. The first occasion was largely attended by other visitors as well as myself and I was driven to the hospital by Dr. Clendinnen who had arranged the demonstration. The second occasion was rather early in the morning and was not so largely attended. I do not remember having seen Dr. Flecker there. However, I was very thankful to the resident staff at the Melbourne Hospital for providing me with some breakfast after this demonstration was over.

I would like to mention one case which impressed itself on my memory. This was a man between forty and fifty years of age, who had been under X-ray treatment for some malignant condition in the lower part of his abdomen, but the exact nature of which I do not remember. As a result of treatment the disease had been sufficiently arrested to enable the man to resume his ordinary occupation, although at the time of the demonstration the lower half of the abdomen was hard and solid to the feel and gave one the impression that it had been filled with plaster of Paris. It is quite probable that others who were present at this particular demonstration, may also remember this case.

All the cases shown at these demonstrations were interesting and instructive and showed a vast improvement on the older methods of treatment. Some of them at any rate had been treated by what I refer to as "medium ray" therapy.

I am not going to enter into a discussion here on the merits or demerits of the different methods of radiation treatment, but will leave it to time and results to settle the question.

At present I am still unconvinced.

Yours, etc.,

V. McDOWALL.

Preston House,
Queen Street, Brisbane.
March 25, 1925.

OVERDOSES.

SIR: I read with interest and approbation the letter from H. Francis and Company relating to "overdoses."

Your correspondent recognizes that it is neither within his rights nor in his capacity to challenge the therapeutic rectitude of any dose ordered, but, so far as his training carries him, the maximum official dose represents the outside limit of safety.

It must be remembered that the legal responsibility for the medicine supplied is shared by the dispenser and it is his duty to direct the prescriber's attention to any apparent irregularity in the dosage.

In one case which came under my notice, a prescription was presented containing a fifteen grain dose of sodium nitrite. The physician, on being reminded of the pharmacopoeial dose (one half to two grains), at once reduced the quantity very substantially and expressed his appreciation of the system that allowed of this double checking.

When unable to communicate with the prescriber, the dispenser may make such modifications as will be compatible with the patient's safety and his own reputation.

If the prescriber will underline and initial any dose which notably exceeds that given as a maximum in the pharmacopoeia, he tacitly admits his recognition of the large dose and at the same time assumes all legal responsibility for it.

Under these conditions which can only be regarded as reasonable, the prescription would be dispensed as written, without question and much time and trouble saved.

This convention is taught to both medical and pharmacy students in this State.

Yours, etc.,

BYRON L. STANTON,

Lecturer in *Materia Medica* and Pharmacy, Melbourne University.

661, Malvern Road,
Toorak, Victoria.

March 24, 1925.

Naval and Military.

APPOINTMENTS.

COLONEL G. W. BARBER, C.B., C.M.G., D.S.O., V.D., has been appointed Director-General of Medical Services to the Australian Military Forces in succession to Major-General Sir Neville Howse, V.C., K.C.B., K.C.M.G.

Books Received.

MEDICAL EDUCATION, by Abraham Flexner; 1925. New York. The Macmillan Company. Royal 8vo., pp. ix. + 334. Price: \$2.50.

COMPEND OF GENITO-URINARY DISEASES AND SYPHILIS, by Charles S. Hirsch, M.D.; Fourth Edition, Revised; 1925. Philadelphia: P. Blakiston's Son & Company. Crown 8vo., pp. xvi. + 337. Price: \$2.00 net.

PHARMACODYNAMIE DES COLLOIDES, par W. Kopaczewski; 1925. Paris: Librairie Octave Doin. Crown 8vo., pp. 327.

OPERATIVE SURGERY COVERING THE OPERATIVE TECHNIC INVOLVED IN THE OPERATIONS OF GENERAL AND SPECIAL SURGERY, by Warren Stone Bickham, M.D. and Ph.M. (Tulane), M.D. (Columbia), F.A.C.S.; in Six Volumes and Index Number; 1924. Philadelphia and London: W. B. Saunders Company. Melbourne: James Little. Royal 8vo.; Volume V.; pp. 880, with 6,378 illustrations. Price: 50s. net.

Medical Appointments.

Dr. W. B. Fry has been appointed Resident Medical Officer, Government Hospital, Kalgoorlie, Western Australia.

Dr. J. Hough has been appointed District Medical Officer and Public Vaccinator at Menzies, Western Australia.

Medical Appointments Vacant, etc..

For announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser," page xviii.

MACKAY DISTRICT HOSPITAL, NORTH QUEENSLAND: Assistant Medical Officer.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, 429, Strand, London, W.C..

| BRANCH. | APPOINTMENTS. |
|---|--|
| NEW SOUTH WALES: Honorary Secretary, 30 - 24, Elizabeth Street, Sydney. | Australian Natives' Association. Ashfield and District Friendly Societies' Dispensary. Balmmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham Dispensary. Manchester Unity Oddfellows' Medical Institute, Elizabeth Street, Sydney. Marrickville United Friendly Societies' Dispensary. North Sydney United Friendly Societies. People's Prudential Benefit Society. Phoenix Mutual Provident Society. |
| VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne. | All Institutes or Medical Dispensaries. Australian Prudential Association. Proprietary, Limited. Mutual National Provident Club. National Provident Association. |
| QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane. | Brisbane United Friendly Society Institute. Stannary Hills Hospital. |
| SOUTH AUSTRALIAN: Honorary Secretary, 12, North Terrace, Adelaide. | Contract Practice Appointments at Renmark. Contract Practice Appointments in South Australia. |
| WESTERN AUSTRALIAN: Honorary Secretary, Saint George's Terrace, Perth. | All Contract Practice Appointments in Western Australia. |
| NEW ZEALAND (WELLINGTON DIVISION): Honorary Secretary, Wellington. | Friendly Society Lodges, Wellington, New Zealand. |

Diary for the Month.

APR. 14.—New South Wales Branch, B.M.A.: Ethics Committee.
APR. 14.—Tasmanian Branch, B.M.A.: Branch.
APR. 16.—Section of Neurology and Psychiatry, New South Wales Branch, B.M.A.
APR. 21.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
APR. 21.—Section of Oto-Rhino-Laryngology, New South Wales Branch, B.M.A.
APR. 21.—Tasmanian Branch, B.M.A.: Council.
APR. 22.—Victorian Branch, B.M.A.: Council.
APR. 24.—Queensland Branch, B.M.A.: Council.
APR. 24.—Eastern Suburbs Medical Association, New South Wales.
APR. 28.—New South Wales Branch, B.M.A.: Medical Politics Committee; Organization and Science Committee.
APR. 30.—New South Wales Branch, B.M.A.: Branch.
MAY 1.—Queensland Branch, B.M.A.: Branch.
MAY 5.—Tasmanian Branch, B.M.A.: Council.
MAY 6.—Victorian Branch, B.M.A.: Branch.
MAY 8.—Queensland Branch, B.M.A.: Council.
MAY 12.—New South Wales Branch, B.M.A.: Ethics Committee.
MAY 12.—Tasmanian Branch, B.M.A.: Branch.
MAY 14.—New South Wales Branch, B.M.A.: Clinical Meeting.
MAY 14.—Victorian Branch, B.M.A.: Council; Election of Representative on Representative Body.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to "The Editor," THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, Sydney. (Telephones: MW 2651-2.)

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